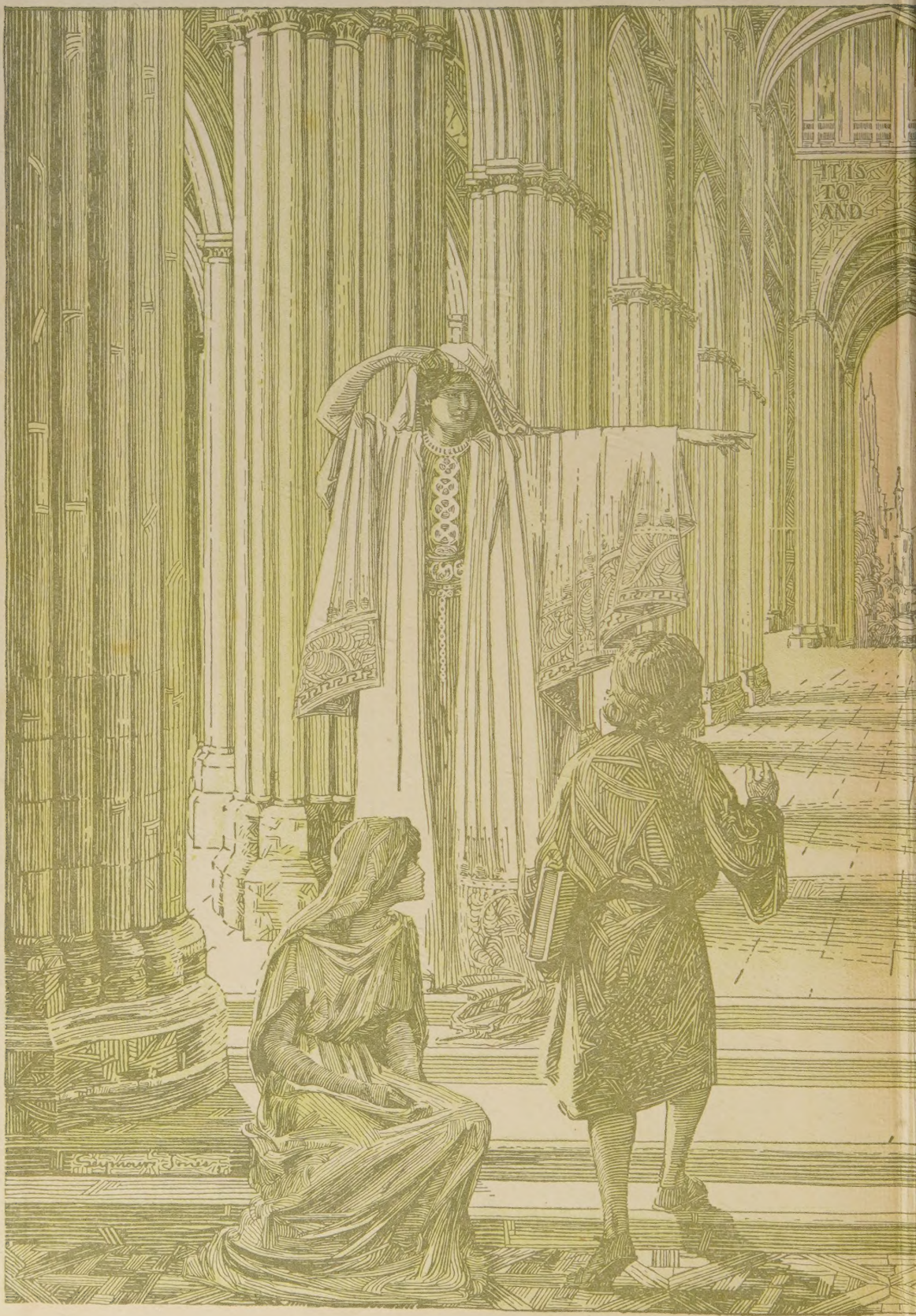


THE NEW
STUDENTS
REFERENCE
WORK







THIS BOOK
BELONGS TO

Matilda and Robert Hallerian

THE NEW
STUDENT'S REFERENCE
WORK

FOR
TEACHERS, STUDENTS AND FAMILIES

EDITED BY
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PATRIOTISM

BY DR. FRANK CRANE

PATRIOTISM is so important because it is a form of loyalty. It is a kind of natural affection. And one who is lacking in it always seems to us to be like one who is lacking in proper love and respect for his parents and the other members of his family.

Patriotism is the same sort of thing as the love of one's home. Anyone who has no attachment to the bit of ground where he was born or where he was brought up seems to us deficient in humanity.

Any one whose heart and mind, therefore, are wholesome and right, will love his country just because it is his, because it stands for that part of the human race to which he belongs.

The same sense of loyalty should be felt also toward the city where we happen to live, to the school we attend, to the class in which we belong and to our family.

This does not mean that we should hate people who are not of our own family or school or city or nation. We can have for them the warmest feeling, but at the same time our own people should remain a little nearer to our hearts.

To despise anyone because he is a foreigner or belongs to a different religion or is a member of another school or has skin of another color from our own—this shows a low and narrow mind.

Very few people understand properly how to be thoroughly patriotic to their own folks and not be hostile to other folks. Especially the ignorant and prejudiced do not understand this.

Every one who pretends to any intelligence or culture at all should know that race prejudice, hatred of another nation or bitterness towards other people, simply because they belong to another group of the human race, is a shameful thing.

Patriotism is a term that is often abused. Many people think they are not patriotic unless they want to make war on another nation, or unless they speak contemptuously of another nation. This is not patriotism; it is sheer vulgar ignorance.

True patriotism is shown by the utmost courtesy and respect for other nations, combined with an honest effort to make our own nation strong, prosperous and happy.

True patriotism is shown by obeying the laws of one's country, by respect for the flag, by reverence for its great heroes, and most of all by striving constantly to make one's own country the best, the most just and the most free country in the world.

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CIVIL GOVERNMENT

GOVERNMENT

Definition: Old classification, Monarchy, Aristocracy and Democracy.

Modern and more valuable classification.

Difference between presidential systems, as that of United States, and parliamentary systems, as that of England.

State government in the United States; county government; township government; city government; school districts, 787.

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The nation a federal republic, powers defined by the national constitution.

Each state a representative republic, without sovereignty and without any relation to any foreign power.

Federal government administered by the executive, legislative and judicial departments, 1973, 1974.

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- (6) **Theology:** Herder 867; Ritschl 1617; Schleiermacher 1689.

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- (4) **Philosophy:** 1472; 1085; Descartes 522; Cousin 468; Comte 438; science 1706.
- (5) **Science (including, also, economics, education and law):** Descartes 522; Pascal 1427; Montesquieu 1256; Hennespin 862; Rousseau 1638; interest 931; D'Alembert 497; Diderot 530; encyclopedia 614; Buffon 286; Cuvier 491; Bastiat 179; Flammarion 680; Fourier 702; Laboulaye 1016; Laplace 1030; Lavoisier 1037; Lenormant 1053; Legendre 1049; Leverrier 1060; Mascart 1183; Pasteur 1427; Réclus 1594; Saint-Hilaire 1657; Saint-Simon 1662.
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- (1) **Essays:** 626; 1090; Addison 12; Coverley 469; Steele 1820.
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- (6) **Philosophy, Religion and Science:** 1090; Berkeley 203; Blackstone 223; Butler 1090; Doddridge 537; Paine 1409; Reid 1599; Adam Smith 1769.

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- a. Poetry:** 1090; Austin 141; Wm. Blake 226; Browning 276; Buchanan 282; Byron 298; Campbell 316; Coleridge 429; *Ancient Mariner* 69; Crabbe 472; Hood 884; Aram 89; Heber 857; Hemans 860; Hunt 899; Keats 994; Keble 994; Landor 1025; Lytton 1128; Matthew Arnold 110; Marston 1177; Moore 1260; *Last Rose of Summer* 1033; Morris 1265; Edwin Arnold 110; Patmore 1429; Procter 1551; Rogers 1624; Rosetti 1635; Scott 1709; *Lady of the Lake* 1020; *Lay of the Last Minstrel* 1040; Lochinvar 1105; Marmion 1174; Shaw 1735; Shelley 1738; Cenci 358; Sladen 1765; Southey 1787; Madoc 1142; Swinburne 1856; Tennyson 1891; *Grail* 790; *Idyls* 913; *Merlin* 1207; *The Princess* 1548; *Round Table* 1638; Tupper 1952; William Watson 2055; Kirke White 2078; Charles Wolfe 2103.

b. Prose:

- (1) **Fiction:** 1091-2; Aguilar 33; Austen 141; Barrie 175; Bayley 1125 (*Lyall*); Besant 207; Black 221; Blackmore 223; Boothby 246; Bronte 272; Dr. Brown 275; *Marjorie Fleming* 1152; T. A. Browne 276; Bulwer 288; Caine 304; Corelli 445; Cotes 463; Dinah Mulock Craik 472; Crockett 479; Churchill 307; Cross 452; Dickens 529; *Bleak House* 226; *Christmas Carol* 395; *The Cricket* 478; *David Copperfield* 452; *Great Expectations* 799; *Old Curiosity Shop* 1328; *Oliver Twist* 1380; *Our Mutual Friend* 1401; *Pickwick Papers* 1438; Disraeli 534; George Eliot 606; *Romola* 1630; *Silas Marner* 1756; Farjeon 648; C. W. Gordon 782; Haggard 823; Harraden 842; Hardy 837; Hawkins 850; Hewlett 871; Henty 865; Hughes 894; Ingelow 927; Kingsley 1006; Hypatia 996; Kipling 1006; Le Gallienne 1049; Lever 1059; Mitford 1243; Macdonald 1134; Marryat 1176; Meredith 1206; Mille 519; Gilbert Parker 1423; Jane Porter 1531; Reade 1589; Ramée 1584; Quiller-Couch 1574; Clark Russell 1645; Leigh Richmond 1612; Olive Schreiner 1704; Scott 1709; *Bride of Lammermoor* 265; *Ivanhoe* 949; *Kenilworth* 996; *Rob Roy* 1620; *The Talisman* 1867; Stevenson 1825; Thackeray 1897; Mrs. Ward 2041; Warren 2043; John Watson 2055; Weyman 2072; Yonge 2123; Zangwill 2129.
- (2) **History and Biography:** 1091; 876; Allison 50; Arnold (Thos.) 110; Bourinot 253; Bruce 281; Buckle 1091; Carlyle 1130; Collingwood 1091; Cox 471; Creasy 1091; Creighton 1091; Cromer 480; Curzon 489; Forster 1091; Freeman 712; Froude 721; Gardiner 736; Greene 802; Grote 807; Hallam 827; Harrison 844; Lecky 1044; Lyall 1091; Macaulay 1130; Maine 1151; Martineau 1179; May 1091; Merivale 1207; McCarthy 1131; Milman 1228; Napier 1300; Norman 1356; Palgrave 1091; Paul 1091; Petrie 1462; Pollock 1091; Prothero 1553; Rawlinson 1589; Rosebery 1634; Rowton 1091; Sayce 1686; Seeley 1718; Goldwin Smith 1770; Stan-

- hope 1810; Dean Stanley 1810; Stubbs 1839; Symonds 1859; Traill 1934; Trevelyan 1091; Sharon Turner 1958.
- (3) **Essays and Criticism:** 1090-2; C. G. Allen 51; M. Arnold 110; Birrel 1092; Blouet 230; Brooke 1091; Carlyle 336; Brougham 274; Cobb 416; De Quincey 522; De Vere 1092; Dobson 1092; Dowden 547; Gladstone 771; Hamerton 830; Howitt 893; Hunt 899; Hutton 1091; Lamb 1023; Sidney Lee 1048; Mackintosh 1090; Mallock 1152; Morley 1262; Pater 1092; Pattison 1092; *Punch* 1561; Ruskin 1644; *King of the Golden River* 1003; Saintsbury 1091; Smiles 1769; Sydney Smith 1771; Stead 1815; Leslie Stephen 1091; John Wilson 2092.
- (4) **Science (including, also, economics, philology, jurisprudence and medicine):** 1091-2; Bagehot 157; S. W. Baker 158; Ball 161; Brewster 265; Clerk-Maxwell 1192; Buckland 283; Darwin 505; Davy 509; Dawson 509; Drummond 555; Faraday 648; Galton 731; Geikie 742; Kelvin 996; Kidd 1091; Layard 1040; Livingstone 1103; Lodge 1107; Lubbock 1122; Lyell 1126; Malthus 1153; Hugh Miller 1227; Mivart 1243; Murchison 1280; Osler 1397; Playfair 1504; Proctor 1551; Ramsay 1585; Rayleigh 1589; Ricardo 1610; Romanes 1628; Salisbury 1665; Selous 1721; Seton 1727; Somerville 1780; Speke 1795; H. M. Stanley 1811; Stewart 1826; Sterling 1827; Tait 1886; Tylor 1961; Tyndall 1961; Daniel Wilson 2091.
- (5) **Philosophy and Theology (including Works on Relations of Religion and Science):** 1091-2; 1471; Balfour 160; Caird 1091; Chalmers 363; Chambers 363; Fairbairn 645; Farrar 649; Flint 1091; Gore 1091; Hall 827; Hamilton 831; Lewes 1060; Liddon 1066; Manning 1161; Mansel 1091; Martineau 1179; Maurice 1091; Mill 1226; Muller (Max) 1276; Newman 1343; Pusey 1564; Robertson 1620; Spurgeon 1806; Trench 1941; Tulloch 1950; John Wesley 2068; Westcott 2069; Whately 2073; Whitefield 2078.

XXIV. CANADIAN.

G. M. Adam 10; W. J. Alexander 45; Grant Allen 51; H. M. Ami 64; Bourinot 253; George Bryce 281; Cotes 463; J. B. Crozier 482; W. H. Drummond 555; W. A. Fraser 710; Fréchette 711; C. W. Gordon 582; G. M. Grant 792; Haliburton 826; Hannay 834; Hughes 894; Maclaren 1139; Marchand 1168; Mille 519; O'Brien 1369; Gilbert Parker 1423; Selwyn 1721; Seton 1727; Shanly 1734; Daniel Wilson 2091; R. R. Wright 2112.

XXV. AMERICAN.

1. THE COLONIAL PERIOD (1607-1783):

- a. **Poetry:** Barlow 1093; Eliot 606; 1092; Hopkinson 1093; *Hail Columbia* 824; Trumbull 1093; *Yankee Doodle* 2120; 1093.
- b. **Prose:**
- (1) **History:** Berkeley 1092; Bradford 256; 1092; Byrd 1092; Captain John Smith 1770; 1092; Pocahontas 1509; Stith 1092; Winthrop 2097; 1092.
 - (2) **Religious Writings:** Cotton 465; Mather 1188; 1092; Woolman 1093; Quakers 1570.
 - (3) **Philosophy:** Edwards 588; 1092; Franklin 708; 1093.
 - (4) **Political Writing and Oratory:** 1092-3; Adams (Sam.) 12; 1093; Hastings 1093; Henry 865; 1093; Jefferson 967, 1093; *Declaration of Independence* 513; Lee (R. H.) 1046; 1093; Warren (J.) 2043; 1093.

2. THE NATIONAL PERIOD (1783-):

a. The Rise of National Literature (1783-1860):

- (1) **Poetry (in order of time):** Freneau 1093; Key 1000, 1093; *Star Spangled Banner* 1812; Mrs. Sigourney 1756; Bryant 280; 1095; Drake 550; 1093; Woodworth 1094; Wilde 1094; Halleck 1093; Greene 1094; Payne 1432, 1094; *Home, Sweet*

Home 883; Willis 2089; 1095; Smith (S. F.) 1770; *America* 62; Longfellow 1112; 1094; *Evangeline* 625; *Hiawatha* 871; Standish 1809; Whittier 2081; *Snowbound* 1774; 1095; Holmes 880; 1094; Poe 1509; *The Raven* 1588; 1095; Lowell 1121; 1094; *Launfal* 1035; Whitman 2079; 1095; Boker 237; Read 1589; 1095; Foster 702; *My Old Kentucky Home* 1294; Alice and Phoebe Cary 344; Larcom 1031; 1097; R. H. Stoddard 1830.

(2) Prose (writers chronologically arranged):

(a) **Fiction:** Brown (C. B.) 274; Cooper 450; *Last of the Mohicans* 1033; *Leatherstocking Tales* 1043; 1094; Irving 943; *Ichabod Crane* 911; 1093; *Rip Van Winkle* 1617; Miss Sedgwick 1717; Mrs. Child 384; Goodrich 780; Hawthorne 851, 1094; *Grandfather's Chair*; *Marble Faun* 1168; Simms 1759; Mrs. Stowe 1834; 1095; Susan Warner 2042; 1097; Mrs. Whitney 1097; Trowbridge 1945; 1097; W. T. Adams 12.

(b) **Belles-Lettres (Criticism, Essays, Humor):** 1093-5; Channing 367; 1094; R. H. Dana 500; Ticknor 1910; Bulfinch 288; Emerson 612; 1094; Margaret Fuller 722; Tuckerman 1949; Shillaber 1742; Thoreau 1906; 1094; R. G. White 2078; D. G. Mitchell 1242; G. W. Curtis 489, 1097; Bayard Taylor 1875; Browne (*Artemus Ward*) 276; William Winter 2097.

(c) **History and Biography:** 1093-5; Wirt 2098; Ramsay 1585; Benton 201; Sparks 1791; Prescott 1544; 1094; Wise 2101; Bancroft 165; 1094; Hildreth 873; Thompson 1905; G. T. Curtis 489; S. W. Williams 2089; Henry Wilson 2091; Headley 853; Lossing 1116; 1095; Motley 1271; 1094; Parton 1426; 1098; Parkman 1424; 1095; Lea 1040; Fisher 677; M. C. Tyler 1961; 1098.

(d) **Oratory and Political Writing:** 1093-5; Petaliah Webster 2064; Washington 2047; Jay 966; 1093; Dane 501; Ordinance of 1787 p. 1391; Alexander Hamilton 830; *The Federalist* 830, 966; 1519; Madison 1142; 1093; Fisher Ames 63; 1093; Monroe 1253; Gallatin 730; Clay 496; 1094; Calhoun 307; 1094; Daniel Webster 2062; 1094; Hayne 852; Everett 636; 1094; Weed 2064; Choate 393; 1094; Garrison 738; 1095; Greeley 801; Phillips 1471; 1095; Sumner 1847; 1095; Douglass 546; C. A. Dana 499; Poore 1527; Nordhoff 1355.

(e) **Philosophy and Religion:** 1093-5; Boudinot 251; Dwight 565; Leonard Bacon 154; Lyman Beecher 193; Alexander Campbell 316; Wayland 2060; Muhlenberg 1275; Bronson Alcott 42; Mark Hopkins 885; Ray Palmer 1413; Freeman Clarke 405; Theodore Parker 1423; Bowen 253; McCosh 1133; Peabody 1432; Noah Porter 1531; Henry Ward Beecher 193; H. R. Smith 1770; Storrs 1834; Collyer 425; Brace 255; Morgan Dix 537; W. T. Harris 843.

(f) **Science (including economics, jurisprudence and philology):** 1093-5; Murray 1281; Rush 1644; Noah Webster 2063; Marshall 1177; Kent 997; Alexander Wilson 2091; Story 1834; Audubon 135; Worcester 2109; Carey 334; Schoolcraft 1690; Walker (A.) 2035; Marsh 1177; Dix 536; Bache 153; Louis Agassiz 25; Guyot 817; Bar-

nard 173; Maury 1191; J. D. Dana 500; R. H. Dana, Jr., 500; Kane 988; Squier 1806; Baird 158; Chadbourne 362; Cooley 449; Winchell 2093; W. D. Whitney 2081; Wells 2067; Terhune 1892; I. L. Hayes 852.

b. The Maturity of American Literature

(1) **Poetry:** 1095-8; Leland 1052; Emily Dickinson 530; Stedman 1819; 1097; Aldrich 43; 1097; Butterworth 297; Randall 1586; *Maryland, my Maryland* 1182; Joaquin Miller 1227; Lanier 1028; Gilder 766; 1097; Carleton 334; Fawcett 651; 1097; Bates 181; Field 659; Markham 1173; Riley 1615; Wilcox 2083; Carman 336; Dunbar 561; *The Battle Hymn of the Republic* 183; Mrs. Howe 892.

(2) **Prose:**

(a) **Fiction (authors in order of time):** 1095-8; Holland 879; 1097; Hale 826; 1095; *Man Without a Country* 1165; R. M. Johnston 977; 1096; Lew Wallace 2036; 1098; Weir Mitchell 1243; 1096; Mrs. Barr 174; Mrs. Davis 508; Helen Hunt Jackson 953 and 1097; Stockton 1829 and 1905; Mrs. Spofford 1800; 1097; Howells 892; 1097; Eggleston (E.) 589; 1095; M. M. Dodge 538; Tourgee 1928; G. C. Eggleston 1098; Bret Harte 845; 1095; Habberton 820; Henry James 958; 1097; Mrs. Phelps—Ward 1465; 1097; Maurice Thompson 1096; G. W. Cable 300; 1097; Mrs. Burton Harrison 844; 1097; Julian Hawthorne 851; 1097; Mrs. Catherwood 1096; Mrs. Foote 692; Westcott 1097; Joel Chandler Harris 842; P. H. Hayne 1097; James Lane Allen 52; 1097; Bellamy 198; Miss French 714; 1097; Miss Murfree 1280; 1097; Lathrop 1034; Goss 1097; Hastings 1097; Robert Grant 1098; Thos. Nelson Page 1408; Marion Crawford 474; 1097; Major 1096; Mrs. Atherton 1097; Mrs. Deland 516; Mrs. Riggs 1615; 1097; Bacheller 1097; Wister 2101; Garland 737; 1097; 1098; Mrs. Wilkins-Freeman 712; 1097; Amelie Rives 1617; R. H. Davis 508; Ford 1096 G. B. McCutcheon 1134; Mrs. Craigie 472; Naylor 1097; Tarkington 1871; 1098; Churchill 397; Crane 473; 1097; Jack London 1112.

(b) **Belles-Lettres (Criticism, Essays, Humor):** 1095-8; H. W. Shaw 1735; Higginson 873; Norton 1361; Mrs. Croly 480; Mrs. Miller 1227; Clemens 408, 1095; Burroughs 295; Scudder 1711, 1098; C. W. Stoddard 1830; Burdette 290; Mable 1129; Brander Matthews 1189; Van Dyke 2003; Bangs 163; Ade 13; Dunne 562; Hapgood 836.

(c) **History (including Biography and Autobiography):** 1095-8; Jefferson Davis 507; A. W. Stephens 1822; 1095; Sherman 1741; Curry 488; U. S. Grant 793; J. D. Cox 471; O. O. Howard 892; P. H. Sheridan 1739; Winsor 2097; 1098; H. H. Bancroft 166; Nicolay 1095; A. D. White 2077; Hurst 901; C. K. Adams 10; Foster 701; Henry Adams 10; Hay 851; 1095; Schouler 1095; Mahan 1148; 1095; Morse 1098; Holst 881; Fiske 678; 1098; Andrews 71; 1095; Rhodes 1098; H. B. Adams 10; Lodge 1107; 1098; Sloane 1767; 1098; McMaster 1140; 1098; Hart 1095; B. I. Wheeler 2075; Woodrow Wilson 2092; Tarbell 1871; Roosevelt 1631; 1098.

- (d) **Oratory and Political Writing:** 1095-8; Lincoln 1073-5; 1094; Mrs. Livermore 1102; Cox (S. S.) 471; Schurz 1705; 1098; Halsted 829; Blaine 224; Miss Dodge 538; Ingalls 926; Ingersoll 926; Watterson 2057; Reid 1599; Beveridge 208; Bryan 280.
- (e) **Philosophy and Religion (authors arranged chronologically):** Cardinal Gibbons 764; Lyman Abbott 1; Phillips Brooks 273; Gladden 770; Archbishop Ireland 938; Bishop Spalding 1789; Ladd 1019; Parkhurst 1424; Patton 1430; Barrows 175; Adler 14; Schurman 1705; Gunsaulus 816; Hillis 874.
- (f) **Science (also including economics, jurisprudence, philology and sociology):** Bascom 177; Hammond 832; Gildersleeve 766; Gilman 767; Eliot 606; Langley 1026; Powell 1541; Newcomb 1341; Flint 682; Brinton 268; Muir 1275; Henry George 752; Packard 1407; Cope 451; F. A. Walker 2035; Wright 2112; Holmes 881; Shaler 1733; Coues 465; William James 958; Kennan 997; G. S. Hall 827; S. E. Tillman 1913; Riis 1615; Coulter 466; Zahm 2128; Ely 610; E. J. James 956; Hadley 822; W. R. Harper 841; Peary 1436; Peck 1437; Albert Shaw 1735; Baldwin 160; N. M. Butler 295; Muensterberg 1274.

XXVI. AUTHORS OF OTHER LITERATURES.

Carmen Sylva (Queen Elizabeth) of Roumania: 607; *Dora d' Istria* (Princess Koltsof-Masalski) of Roumania 1010; Gorki of Russia 783; Huss of Bohemia 901; Ixtlilxochitl of Mexico 951; Kosuth of Hungary 1012; Maeterlinck of Belgium 1143; Nordau of Hungary 1354; Sienkiewicz of Poland 1753; Tolstoi of Russia 1921; Turgeney of Russia 1954; Vambéry of Hungary 2000; Ulfilas of the Goths 1964; Goths 785.

XXVII. YOUNG FOLK'S LITERATURE.

1. BOOKS FOR EARLY CHILDHOOD: 1098.

(The figures denote the pages where the subjects or authors are discussed.)

Andersen 69: <i>Fairy Tales</i> .	Kingsley 1005: <i>Greek Heroes</i> .
Baldwin: <i>The Story of Roland</i> 1625;	Kipling 1006: <i>Puck of Pook's Hill</i> and
<i>The Story of Siegfried</i> 1756; <i>The</i>	<i>Wee Willie Winkie</i> .
<i>Story of Troy</i> 1945.	Lanier 1028: <i>The Boys' King Arthur</i> .
Church: <i>Stories from Herodotus</i> 868;	Lowell: <i>Jason's Quest</i> 95; 965.
<i>Stories from The Iliad</i> 882; <i>Stories</i>	Longfellow 1112: <i>Hiawatha</i> 871.
<i>from The Odyssey</i> 1965.	Mable 1129: <i>Norse Stories</i> 1295.
Eugene Field 659: <i>Poems and Stories</i> .	<i>Mother Goose</i> 1270; 1454.
Greene: <i>King Arthur</i> 114.	Peabody: <i>Old Greek Folk-Stories</i>
Grimm 806: <i>Fairy Tales</i> .	1295.
Hawthorne, N. 851: <i>Tanglewood Tales</i>	R. L. Stevenson 1825: <i>Book of Poems</i>
and <i>The Wonder-Book</i> .	<i>The Bible</i> 209; <i>Stories</i> .

2. BOOKS FOR LATER CHILDHOOD: 1099.

a. Fiction and Poetry:

Addison 12: <i>Sir Roger de Coverley</i>	Robert Browning 276: <i>The Pied Piper</i>
469.	and <i>How They Brought the Good</i>
Aldrich 43: <i>The Story of a Bad Boy</i> .	<i>News</i> .
<i>Arabian Nights' Tales</i> 1084.	Bunyan 290: <i>The Pilgrim's Progress</i>
Andrews: <i>Ten Boys</i> .	1490.

Mrs. Burnett 293: *Little Lord Fauntleroy*.
 Cervantes 361: *Don Quixote*.
 Clemens 408: *Huckleberry Finn* and *Tom Sawyer*.
 Cooper 450: *The Last of the Mohicans* 1033.
 Defoe 515: *Robinson Crusoe*.
 Dodgson 538: *Alice's Adventures and Through the Looking Glass*.
 George Elliot 606: *Silas Marner* 1756.
 Goldsmith 778: *The Deserted Village* and *The Vicar of Wakefield* 2018.
 Hughes 894: *Tom Brown's School-days*.
 Irving 943: *Sketches and Tales of a Traveler*.
 Kingsley: *The Water Babies*.
 Lamb 1023: *Tales from Shakespeare*.
 Macaulay 1130: *Lays of Ancient Rome* 1620.

Masson: *Little Masterpieces. Peasant and Prince*.
 Pyle 1565: *Adventures of Robin Hood* 884.
 Ramee 1584: *A Dog of Flanders* and *The Nurnberg Stove*.
 Ruskin 1644: *The King of the Golden River* 1003.
 Scott 1709: *Ivanhoe* 949; *The Lady of the Lake* 1020; *Rob Roy* 1620; *Tales of a Grandfather*.
 Anna Sewall: *Black Beauty*.
 Shakspeare 1733: *The Merchant of Venice* 1206.
 Stevenson: *Treasure Island*.
 Swift 1856: *Gulliver's Travels* 272; 1071.
 Thackeray 1897: *The Rose and the Ring*.
 Warner 2042: *Being a Boy*.
 J. R. Wyss: *Swiss Family Robinson*.

b. Heroes and Stories of the Nations:

Dickens 629: *A Child's History of England* 615.
 Franklin 708: *Autobiography*.
 Guerber: *The Story of the English* 618.
 Higginson 873: *Young People's History of the United States* 1967; 86.
Lives: Alfred the Great 47.
 Alexander the Great 44.
 Julius Cæsar 303.
 Oliver Cromwell 481.
 Daniel Boone 244.

Kit Carson 342.
 Robert La Salle 1032.
 Abraham Lincoln 1073.
 William Penn 1446.
 Peter the Great 1459.
 Captain John Smith 1770.
 Miles Standish 1809 and others of peculiar interest to children.
 Plutarch 1506: *Lives of Famous Men*.
 Scudder 1711: *Life of Washington* 2047.

c. Travel and Adventure: 1099.

Samuel Champlain 365.
 Captain Cook 449.
 Christopher Columbus 430.
 Fernando de Soto 523.
 Francis Drake 549.
 John C. Fremont 713.
 Vasco da Gama 732.

Sven Hedin 857.
 David Livingstone 1103.
 Lewis and Clark 1060.
 Ferdinand Magellan 1144.
 Fridtjof Nansen 1299.
 H. M. Stanley 1810.

d. Stories from Nature: 1099; 1307; 1309.

Ball 161: *Starland* 1813.
 Burroughs 295: *Birds and Bees* 190; 217; *Squirrels* 1806.
 Higginson 873: *Three Outdoor Papers*.
 Keyser: *Bird-Land* 217.
 Kingsley: *Madam How and Lady Why* and *Town-Geology*. 1099.
 Lowell 1121: *A Good Word for Winter*.
 Mathews: *Familiar Flowers*. 1099.

Olive Thorne Miller 1227: *First Book of Birds and Birds Through an Opera-Glass*.
 Pearson: *Stories of Bird-Life*. 1099.
 Seton 1727: *Krag and Johnny Bear*.
 Thoreau 1906: *Walden*.
 Torrey: *The Footpath Way*. 1099.
 Wheelock: *Nestlings in Forest and Marsh*. 1099.
 White (Gilbert): *Natural History of Selborne*. 1099.

3. IMPORTANCE OF LITERATURE FOR THE YOUNG: 1099.

4. METHODS OF TEACHING: 1099; 1100.

5. ENGLISH CLASSICS IN THE SCHOOLS: 1100

- Matthew Arnold 110; *Sohrab and Rustum*.
 Hawthorne: *Tales of the White Hills* 2079.
 Irving: *Rip Van Winkle and Sleepy Hollow* 911.
 Longfellow: *Courtship of Miles Standish* 42; 1809.
 Lowell: *The Vision of Sir Launfal* 1035.
 Motley 1271: *Peter the Great*.
 Schurz 1705: *Abraham Lincoln* 1073.
 Scott: *Marmion* 1104.
 Shakspeare: *Julius Cæsar* 303.
 Daniel Webster 2062: *Bunker Hill Speech* 289.
 Whittier 2081: *Snowbound* 1774.

6. IMPROVED METHOD OF INTERPRETING LITERATURE: 1100.

7. PERIODICAL LITERATURE: 1100.

8. THE OPPORTUNITY OF THE HOME: 1100.

9. BOOKS ABOUT BOOKS FOR CHILDREN: 1100.

- Baldwin: *The Book-Lover*.
 Chubb: *The Study and Teaching of English*.
 Clark: *How to Teach Reading*.
 Dye: *The Story-Teller's Art*.
 Lowell: *Books and Reading*.
 McMurtry: *Oral Work with Stories; Special Method in Primary Reading; Special Method in Reading English Classics*.
 Thacher: *The Listening Child*.
 Van Dyke: *Counsel on Reading*.
 Wiltse: *The Place of the Story in Early Education*.

PHYSICS

1. PROPERTIES OF MATTER: Physics 1482; science 1706; force 692; conservation 445; perpetual motion 1454.

- a. Fundamental units of measurement standards: 1195; 1213; 570.
 - b. Gravitation: 796; 1184.
 - c. Acceleration: dynamics 566; inertia 925.
 - d. Laws of motion: dynamics 567; least action 1042; centrifugal force 360; simple harmonic 1759.
- 2. MECHANICS OF SOLIDS:** 1196; 1814.
- e. Machines: Wheel 2074; windmill 2093; screw propeller 1711; pump 1561; lathe 1034.
 - 1. Lever: 1059.
 - 2. Pulley: 1560; 228.
 - 3. Inclined plane: 917.
 - 4. The Pendulum: 1144.
 - 5. General law of machines: 567.

- a. Pressure in liquids due to gravity: pressure 1546; water-wheel 2053; siphon 1761.
 - b. Pressure due to externally applied force: manometer 116; hydraulic motor 903; elevator 605.
 - c. Pascal's experiment: 174.
 - d. Specific gravity: 521.
 - e. The hydrometer: 906.
- 3. MECHANICS OF FLUIDS:** 903; 2025; 1851.

- a. Pressure of atmosphere: 33; 72.
 - b. Barometers: 174.
 - c. Boyle's law: 255.
 - d. Diving bells: 536.
 - e. Balloons and airships: 18.
 - f. Airpump: 34; 1997.
- 4. MECHANICS OF GASES:** 1508; 946; 438; 1078.

- a. Relative motion of molecules: Wave motion 2058; simple harmonic motion 1759.
 - b. Vapor pressure:
 - 1. Dew point: 526.
 - 2. Humidity: 2051; 412; 1582.
 - 3. Evaporation: 636.
 - c. Temperature: 1886; heat 855; thermometer 1900; pyrometer 1567.
 - d. Elasticity: 593; testing machines 1894; Hooke's law 884.
- 5. MOLECULAR MOTION:**

- a. Transmission of light: light 1067; ether 627; light waves 2059.
- b. Reflection: 1067; dispersion 534; heliograph 859.
- c. Refraction: 1067; diffraction 531; diffraction grating 531; spectroscope 1793; plucker tube 1506; interference 932; polarization 1515.
- d. Prisms: 1550; 1125.

6. STUDY OF LIGHT:

- e. Optical instruments:
 - 1. Lenses: 1053; eye 643; spectacles 1793; focus 688.
 - 2. Photography: 1476; camera 315.
 - 3. Microscope: 1220.
 - 4. Telescope: 1885; opera-glass 1386; micrometer 1220; telemeter 1883; magic lantern 1144.
- f. Color: 427 color photography 1477; actinism 9.

7. STUDY OF HEAT:

- a. Charles' law: 370.
- b. Work: Erg 623; caloric 311; heat 856.
- c. Power: 1541; dynamometer 569; radiometer 1579.
- d. Energy: force 692; geyser 762.
- e. Specific heat: 1793; 856.
- f. Heat engines: Gas engine 740; automobile 147; steam engine 1815; governor 788; indicator 922; turbine 1153; boiler 236; stoker 1830; injector 926; safety valve 1652.
- g. Artificial refrigeration: 1598; ice machines 911.
- h. Conduction, convection and radiation of heat: heat 855; radiation 1579.
- i. House heating: 856.

8. STUDY OF SOUND:

- a. Sound and its transmission: 8.
- b. Wave motion: 2058.
- c. Velocity of sound: 8.
- d. Reflection of sound: 579.
- e. Loudness of sound: 8.
- f. Pitch: 1495.
- g. Vibration: Acoustics 8; resonance 1602; phonograph 1474; voice 2026.
- h. Musical instruments: Violin 2022; organ 1393; piano-forte 1487; harp 841; flute 687; lute 1124; reed 1597; bagpipe 157; saxhorn 1685; saxophone 1686; trombone 1944; cymbals 492; drum 554; tambourine 1868; guitar 813.
- i. Harmony: 838; music 1286.

9. MAGNETISM:

- a. Magnets: 1145; 907.
- b. Magnetic field: 1145.
- c. The earth as a magnet: 1145.
- d. The compass: 435.

10. STATIC ELECTRICITY: Roentgen rays 1624; cathode rays 351; Becquerel rays. 190.

11. CURRENT ELECTRICITY:

- a. Current: 597; dynamo-electric machines 568; voltmeter 2029; galvanometer 731; transformers 1934; armature 104.
- b. Potential: 1537.
- c. Resistance: Ohm's law 598; Wheatstone's bridge 2074.
- d. Units of electrical measurement: 599; power 1542; ampère 65.
- e. Cells: Voltaic cell 597; battery 182; storage battery 1833.
- f. Chemical, magnetic and heating effect of the current: 597; induction coil 923; lines of force 1077; lightning arrester 1069; magnetic induction 1145; thermostat 1901.
- g. Electroplating: plating 1502; electrolysis 603.
- h. Dynamo: 568.
- i. Motor: electric motor 600; motor 1271; Niagara power 1346; trolley-cars 1943.
- j. The telegraph: 1881; wireless 1883; cable 301; telephone 1884; electric lamps 599; microphone 1220; photophone 1478; telephotography 1885; phonophone 1475; telautograph 1881.

DISTINGUISHED PHYSICISTS: Archimedes 92; Galileo 730; Newton 1344; Torricelli 1925; Huygens 902; Regnault 1598; Fahrenheit 645; Celsius 357; Kepler 1000; Watt 2056; Davy 509; Faraday 648; Maxwell 1192; Hertz 870; Bunsen 289; Herschel 869; Kelvin 996; Helmholtz 860; Thomson 1906; Rowland 1639; Tesla 1894; Michelson 1218; Boyle 255; Gilbert 766; Bacon 154; Franklin 708; Cavendish 353; Galvani 731; Volta 2028; Rumford 1643; Carnot 338; Clausius 406; Joule 980; Young 2125; Fresnel 718; Draper 551; Fraunhofer 710; Kirchhoff 1006; Langley 1026; Newcomb 1341; Oersted 1372; Ohm 1375; Henry 864; Weber 2062.

BOTANY

THE SCOPE OF THE SUBJECT: Botany 249.

DIVISIONS OF THE STUDY:

Taxonomy—the classification of plants 1875.

Morphology—the forms of plants 1264.

Physiology—the activities of plants 1487.

Ecology—the environment of plants 580.

I. TAXONOMY:

THE FOUR DIVISIONS OF THE PLANT KINGDOM:

1. **Thallophytes**: meaning thallus-plant; having a characteristic plant-body 1897.
2. **Bryophytes**: having distinct alteration of generations and more complex body 281.
3. **Pteridophytes**: having a leafy and vascular sporophyte; and producing no seeds 1558.
4. **Spermatophytes**: meaning seed-plants, called flowering plants 1797.

(Note: The first three of the above divisions are called Cryptogams—plants that do not produce seeds—484. There is also a group between plants and animals called Myxomycetes: 1297.)

1. THE THALLOPHYTES: the lowest group of plants 1897.

- | | | | | |
|---|---|--|---|--|
| a. The Algae: most primitive forms of the plant kingdom 48; and making their own food with chlorophyll 393. | { | (1) The Cyanophyceæ: the blue-green algæ, or green slimes 491; coenocyte 419; Heterocyst 871. | { | (a) Protococcus forms: 1554. |
| | | (2) The Chlorophyceæ: the green algæ 392. | | (b) Conferva forms: 392. |
| | | (3) The Phæophyceæ or brown algæ: 1463; the Sargassum, making the Sargasso seas 1681. | | (c) Siphon forms: as spirogyra 1800. |
| | | (4) The Rhodophyceæ or red algæ; prized souvenirs of the seashore 1609; Lichens—intermediate forms 1065; symbiosis 1859. | | (d) Conjugate forms: or brown algæ 1463. |
- b. The Fungi: taking their food from other plants 724; parasites 1420; saprophytes 1678; mycelium 1293; mycorrhiza 1294.

- | | | |
|---------------------------|---|--|
| (1) Four groups of fungi: | { | (a) Phycomycetes: 1479; as black-moulds, downy mildews 1224; coenocyte 419. |
| | | (b) Ascomycetes: 17; blue-moulds, truffles, 1946; and perhaps yeasts 2121; mildews 1224. |
| | | (c) Æcidiumycetes: 17; as rusts 1649; and smuts 1772. |
| | | (d) Basidiomycetes: as mushrooms 1284; toadstools 178. |

2. THE BRYOPHYTES: the second group of plants 281.

a. The Hepaticæ: the liverworts 865; rhizoids 1606.

- (1) Marchantiales: 1168; green above and with rhizoids on under surface 1606.
- (2) Jungermanniales: like delicate moss 865.

(3) **Anthrocerotales**: from which the mosses came 1270; and perhaps ferns and seed-plants 78.

b. The Musci: 1282; known as mosses, about 3000 species 1270.

(1) the sphagnum mosses: bog-mosses which form peat 1797; 1436.

(2) True mosses: 1270.

3. THE PTERIDOPHYTES: 1558.

a. The Lycopodiales: called club-mosses or ground-pines 1125.

(1) **Lycopodium**: coarse forms 1125.

(2) **Selaginella**: the "little club-mosses" 1125.

b. The Equisetales: known as horse-tails or scouring rushes 622.

c. The Filicales: known as the ferns, with about 4000 species 661.

(1) The groups of ferns:
656:

- (a) Tall swamp-ferns.
- (b) Coarse ferns of swamps and woods.
- (c) Small and medium sized ferns.
- (d) Delicate rock and wood ferns.
- (e) The brake fern — growing to seven feet.
- (f) Maiden-hair fern—most highly regarded fern.
- (g) The evergreen wood-fern.

4. THE SPERMATOPHYTES: reproducing themselves by means of seeds 1797.

a. The Gymnosperms: naked seed-plants 818.

- (1) The **Gnetums**: growing in deserts and the tropics.
- (2) The Ginkgo or maiden-hair tree 767.
- (2) The **Cycads**: probably came from the ferns 492.
- (4) The **Conifers**: the greatest group of living gymnosperms 443; containing pines 1491; spruces (fir) 675; hemlocks 860; redwoods (sequoia) 1724; cedars 354; cypresses 492; junipers 982; yews 2126.

b. Angiosperms: seeds exposed—the most recent group of plants 73.

(1) The **Monocotyledons**:
1292.

- (a) **Grasses**: 795.
- (b) **Lilies**: 1070.
- (c) **Orchids**: 1390.
- (d) **Palms**: 1412.
- (e) **Epiphytes**: air-plants 622; like Spanish moss, orchids 1390.

(2) The **Dicotyledons**:
100,000 species 530.

- (a) **First series**: morning glories 1263; phloxes 1472; gentians 744; mints 1237; verbenas 2010; composites 435; which include asters 126; thistle 1904; goldenrod 778; sunflowers 1849; chrysanthemum 396; daisy 496; sage 1653; dandelion 500.
- (b) **Second series**: buttercups 296; mustards 1292; cabbage, cauliflower, rutabaga and turnip 1292; roses 1633; common forest trees—as oak 1367; hickory 872; walnut 2038; birch 192; elm 609; poplar 1528.

II. MORPHOLOGY.

1. THE CELL: the unit of structure 355.

- a Cellulose: cell-wall 357.
- b Protoplasm: the living substance of the cell 1554.
- c Karyokinesis: cell division 993; as in diatoms 527; and nostoe 492.
- (1) Meristem or formative tissue 1207.

2. THE SPORES: special cells for reproduction 1803.

- a The Archosporium: which sets apart certain cells for reproduction 91.
- b Asexual spore: —formed by cell division 117.
- (1) The sporangium: in which the spores are formed 1803.
- (2) The tetrad formation: four sister spores 1894.
- (1) The gametes: or sexual cells 735.
- (2) The antheridium: or male organ 78.
- (3) The archegonium: or female organ 91.
- (4) The sperm: the male cell 1796.
- (5) The oosphere: the female cell 1385.
- (6) The oospore: or fertilized egg 1385.
- c Sexual spore: formed by union of cells 1730.

3. ALTERNATION OF GENERATION: 55.

- a. Gametophytes: the generation producing sex-organs 55; apogamy 83.
- b. Sporophytes: the generation producing asexual spores 1804; apospory 83.
- c. Homospory: in which the gametes are alike 883.
- d. Heterospory: in which the gametes are unlike 871.
- (1) Microspores: producing male gametophyte 1221; microsporangium 1221.
- (2) Megaspores: producing a female gametophyte 1199; megasporangium 1199.

4. THE SEEDS: which produce the flowering plants 1718.

a. Parts of the seed:

- (1) The testa: or hard coat upon which hairs and wings grow 1894.
- (2) The embryo: the essential part of the seed 611;
- (a) Cotyledons: the first leaves developed 465.
- (b) Hypocotyl: the stem-like portion beneath 907.
- (3) The endosperm: food tissue within embryo 614.
- (4) The perisperm: food tissue outside embryo 1452.

b. The dispersal of seeds
1717.

- (1) **By currents of air:** as the thistle 1904; milkweed 1226; dandelion 500;
- (2) **By currents of water:** from headwaters to floodplains and banks.
- (3) **By animals:** indigestible seeds; and grappling appendages.
- (4) **By explosive fruits:** forcibly discharging seeds.

5. THE SHOOT: part of the plant growing upward 1747.

a. The Stem: axis of the plant 1821.

- (1) **The meristem:** formative tissue in all growing organs 1207.

(2) **The dermatogen:** the embryonic region producing epidermis 522;

- (a) **The epidermis:** protective covering of all higher plants 621;
- (b) **The hypodermis:** cells just beneath epidermis 907;
- (c) **The collenchyma:** having a pearly-white luster 425.
- (d) **The hair:** cells formed outside the epidermis 825.

- (3) **The periblem:** the embryonic region producing cortex 1452.

- (a) **The cortex:** tissue containing the active cells 462; the bark 172; the bast 179; the cork 456.

- (4) **The plerome:** the embryonic region producing the stele 1504.

(a) **The stele:** the central region of mature stems 1821.

- 1. **The vascular bundles:** the conducting system 2004; sclerenchyma 1707; the xylem or wood 2118, containing the trachea 1930; the phloem or bast—for the transfer of food 1472.
- 2. **The heartwood:** the colored wood 854.
- 3. **The sapwood:** new wood through which sap flows 1678.

- (5) **The bud:** an undeveloped shoot 283;

- a. **Leaf-buds:** from which the axis grows.
- b. **Flower-buds:** from which the flower comes.

- (6) **Rootstock or rhizom:** an underground stem 1633.

- a. **The Tuber:** one form of underground stem 1948; as potato 1537.

- (7) **The node:** joints in the stem 1354.

- (8) **The internodes:** portions of stem between the nodes 933.

b. The Branch: a repetition of the axis of stem 259.

- (1) **Dichotomous branching:** axis dividing into two branches 529.
- (2) **Monopodial branching:** giving of branches from side of stem 259.
- (3) **Chladophyll:** branches which replace leaves 403.
- (4) **The axil:** where branches normally arise 149.

c. The Leaf: expanded organ of higher plants, for displaying green tissue to air and sunlight 1041.

- (1) **Deciduous leaves:** growing off every year 512.

(2) **Phyllotaxy or the arrangement of leaves.**

- (a) **The verticillate or cyclic arrangement:** two or more leaves at one node 1480.
- (b) **The alternate or spiral arrangement:** single leaf at each node 1480.

1. **Angular divergence:** how obtained.

(3) **Structure of the leaf.**

- (a) **External:** blade—expanded part of the leaf 1041; petiole—stalk upon which the leaf grows 1461; stipules—appendages at the axil 1827.
- (b) **Internal:** epidermis—upper and lower surfaces of leaf 622; stomata 1831; cuticle 490; mesophyll—giving the leaf its color 1209; chloroplast 393; vein ends—penetrating among mesophyll cells 1041.
- (c) **Closed venation:** parallel veined leaves, as in grass and the lily 1041.
- (d) **Open venation:** net-veined or reticulate
 - 1. **Pinnate leaves.**
 - 2. **Palmate leaves.**
 1041.

(4) **Special forms in leaf structure:** 1042; bracts 255; cupule 487; palet 1411; glumes 775; scales 1686; bulb 286; spines 1799; tendril 1888; pitcher plants 1495; carnivorous plants 338.

(5) **Position of leaf:**

- (a) **Dorsiventral:** exposing two surfaces to different conditions 545.
- (b) **Radial:** all sides exposed alike 545.
- (c) **Profile:** one edge turned toward intense sunlight, as compass-plants 435.

6 THE ROOT: that part of the plant growing downward 1632.

- a. **Epidermis:** the outside covering.
- b. **Cortex:** more or less thickened.
- c. **Axis:** the woody central part.
- d. **Root-cap:** that protects the tip cells in burrowing.
- e. **Root-hairs:** to help the root in absorbing.
- f. **Root tubercles:** which supply the plant with nitrogen 1633.
- g. **Rhizoids:** holdfasts and absorbing organs 1606.
- h. **Mycorrhiza:** aiding roots in absorbing 1294.

7. THE FLOWER: a modified shoot of seed-plants 685.

a. **Where and how the flowers grow:** 925.

- (1) **Solitary:** occurring solitary upon plants.
- (2) **Inflorescence:** clusters of flowers.

(a) **The botryose type:** lowest flowers the oldest—prominent botryose types of inflorescence: raceme; panicle; thyrsus; corymb; umbel; spike; spikelet; head; ament or catkin; spadix.

(b) **The cymose type:** topmost flowers the oldest—cyme cluster, resembling the corymb.

b. Structure of the flowers:

(1) **The receptacle or torus:** in which the floral organs are inserted 1592.

(2) **The floral organs:**

- | | | |
|--|--|---|
| (a) Floral leaves:
the two outer sets of organs: | 1. The calyx: 312; composed of sepals 1724.
2. The corolla: 459; composed of petals 1459. | { a. The filament: a stalk-like portion 661.
b. The anther: which bears pollen 78; pollen 1518; connective 445. |
| (b) Sporangial leaves:
the two inner sets of organs: | 1. The stamens:
outermost set of sporangial leaves 1808.

2. The carpels: inner set of sporangial leaves 340. | { a. The pistil: an individual carpel 1494.
1. The ovulary: 1402.
2. The style: 1842.
3. The stigma: 1827. |

- | | |
|--|--|
| (c) Modification in the forms of flowers: | (1) Apetalous: one set of floral leaves lacking 82.
(2) Naked: both sets of floral leaves lacking 686.
(3) Pistillate: stamen set lacking 686.
(4) Staminate: carpels lacking 686.
(5) Syncarpous: carpels united 1860.
(6) Apocarpous: carpels separated 83.
(7) Sympetalous: petals united 1860.
(8) Polypetalous: many petals 1522.
(9) Actinomorphic: regular petals 9.
(10) Zygomorphic: unlike petals 2138.
(11) Gamosepalous: sepals united 686.
(12) Monodelphous: all filaments united 686.
(13) Perianth: calyx and corolla united 1452.
(14) Epigynous: sepals, petals and stamens above ovulary 622.
(15) Hypogamous: sepals, petals and stamens beneath ovulary 907. |
|--|--|

III. PHYSIOLOGY.

General Reference: The activities of plants 1487.

1. **NUTRITION:** processes by which food is obtained and utilized 1366.

a. How plants obtain food:

- (1) **Absorption:** by which materials are taken into the plant body 5.
- (2) **Aeration:** means for taking in and expelling air and dioxid 18.
- (3) **Respiration:** by which energy is set free in the plant 1602.
- (4) **Water transfer:**
 - (a) Ascent of water through vascular system 2051.
 - (b) Transpiration or of water by evaporation 1936.
 - (c) Turgor or pressure of water within the cells 1954.

b. How plants utilize their food:

- (1) **Metabolism:** all the chemical processes of the living organism 1210.
- (2) **Digestion:** changing insoluble foods to soluble or soluble to simpler forms 532.
 - (a) Enzymes: or soluble ferments 620.
 - (b) Fermentation: decomposition of substances by living plants 656.
- (3) **Secretion:** substances separated from the protoplasm 123.
- (4) **Assimilation:** changing foods into protoplasm 123.
- (5) **Foods:** materials used in formation and repair of plant-body 690; carbohydrates 332; proteids 1553.
- (6) **Photosynthesis:** the process of making sugar and starch food 1479; chloroplast 393; chlorophyll 393.

c. How plants grow:

- (1) **Growth:** alteration of form, increase in size 808.

2. REPRODUCTION: making new plants 1601.

a. Vegetative propagation:
1552.

- (1) **Gemmæ:** mass of cells producing a new body 742.
- (2) **Runner:** a branch which takes root at the tip 1643.
- (3) **Rootstock:** underground stem sending up shoots 1633; tuber 1943.
- (4) **Grafting:** propagation by a budbearing portion of plant 789.

b. Reproduction by means of spores: 1803.

- (1) **Pollination:** transfer of pollen from stamen to stigma 1518.
- (2) **Conjugation:** union of sexual cells which are alike in appearance 443.
- (3) **Fertilization:** union of unlike cells, sperms and eggs 657.
- (4) **Germination:**
 - 1. Formation of new plants by spores. 760.
 - 2. Formation of plant from seed.

IV. ECOLOGY.

General Reference: the relation of plants to their environment 580.

1. MOVEMENTS IN PLANTS: 1273.

a. Motor organ: portion of leaf stalk sensitive to a stimulus 1271.

b. Irritability: a condition of protoplasm in which it undergoes a change 943; sensitive plants 1734.

- (1) **The stimulus:** a change in the surroundings.
- (2) **The reaction:** the consequent change in the protoplasm.
- (3) **The death of plants:** a loss of irritability.

- c. **Chemotaxis:** sensitiveness to a onesided chemical stimulus 376.
- d. **Chemotropism:** sensitiveness to a onesided chemical stimulus 376.
- e. **Geotropism:** sensitiveness to the earth's gravitation 755.
- f. **Heliotropism:** sensitiveness to a change in direction of light 859.
- g. **Hydrotropism:** sensitiveness to presence of moisture 904.
- h. **Phototaxis:** sensitiveness to unequal illumination 1479.
- i. **Rheotropism:** sensitiveness to a direction of current of water 1606.
- j. **Thermotropism:** sensitiveness to heat coming from one side 1901.
- k. **Twining:** caused by sensitiveness to contact 1960.

2. MEANS USED FOR POLLINATION:

- a. **Amenophilous plants:** using the wind for pollination; gymnosperms 818.
- b. **Entomophilous plants:** using insects for pollination; insects and flowers 930.
 - (1) **Self-pollination:** pollen transferred to its own stigma 1519.
 - (2) **Cross-pollination:** pollen transferred to stigma of another flower 1519.

3. RELATION TO FOOD SUPPLY:

- a. **Symbiosis:** living together of plants 1859.
 - (1) **Parasitism:** in which the host is injured 1420.
 - (2) **Mutualism:** in which the host is benefited 1293.
 - (3) **Helotism:** in which the host is neither benefited nor injured 860.
- b. **Saprophytes:** which obtain food from decaying bodies and organic products 1678.
- c. **Carnivorous plants:** which capture insects for food 338.
- d. **Epiphytes:** getting all food from the air 622.
- e. **Hydrophytes:** plants living in water 904.
 - (1) **Free floating societies:** entirely sustained by water.
 - (2) **Pondweed societies:** anchored but submerged.
 - (2) **Swamp societies:** rooted in water but rising above surface.
- f. **Xerophytes:** adapted to dry soil and air 2117.
- g. **Halophytes:** growing in saline or alkaline soil 828.
- h. **Sensitive plants:** folding leaves to avoid drought and too intense light 1724.
- i. **Geophilous plants:** with special structures for preservation 563.

4. DURATION IN PLANTS: 562.

- a. **Annual plant:** lasting a single season 75.
- b. **Biennial plant:** foliage one year, stalk the next 210.
- c. **Perennial plant:** living from year to year 1451.

STUDY OF THE HUMAN BODY

HISTORY OF THE SUBJECT: 212.

Divisions:

- a. Anatomy, which explains the structure of the body 67.
- b. Physiology, which explains the vital activities 1486.
- c. Hygiene, which treats of the preservation of health 905.

I. ANATOMY:

1. THE SKELETON: 1763.

- a. Bone: the hard material of the skeleton 242.
- b. Cartilage: the gristle or soft bone: 806.
- c. Skull: the hard framework of the cranium 1764.
- d. Hand: 833.
 - (1) The carpus or wrist, with 8 bones.
 - (2) The metacarpus or palm, with 5 bones.
 - (3) The digits or fingers, with 14 phalanges.
- e. Foot: 690.
 - (1) The tarsus or ankle.
 - (2) The metatarsus or instep.
 - (3) The phalanges or toes.

2. THE MUSCLES: 1283.

- a. Voluntary or striated: which are controlled by the will.
- b. Involuntary or smooth: not controlled by the will.
- c. Heart muscle: striated and branched.
- d. Belly: the middle part of the muscle.
- e. Tendon: the ends of the muscle.
- f. Origin: the end attached to a fixed bone.
- g. Insertion: the end attached to the moving bone.

3. THE SKIN:

- a. Epidermis: or outer skin composed of cells 1764.
- b. Dermis: the inner and true skin 1764.
- c. Sweat glands: which open through the skin 1764.
- d. Hair: which grows from the epidermis 824.

4. THE NERVES: 1320.

- a. White tissue: which is composed of fibers.
- b. Gray tissue: which is composed of nerve cells.
- c. Sensory nerves: made up of sensitive fibers.
- d. Motor nerves: made up of motor fibers.
- e. Tropic nerves: which regulate nutrition.
- f. Secretory nerves: which stimulate secretion.
- g. Cranial nerves: connected with head, heart, stomach and intestines.

5. THE BLOOD:

- a. Plasma: the fluid part of the blood 1725.
- b. Fibrin: fine threads contained in the plasma 1725.
- c. Serum: the liquid part of the plasma 1725.
- d. Red corpuscles: containing hæmoglobin which holds oxygen 228.
- e. White corpuscles: which can creep and change form 228.
- f. Lymph: which arises from the plasma in the capillaries 1126.
- g. Systemic circulation: blood going through the system 228.
- h. Pulmonary circulation: blood going through the lungs 228.
- i. Portal circulation: blood going through the liver 1102.

6. THE HEART:

- a. **Auricles:** chambers of the heart that receive blood 853.
- b. **Ventricles:** chambers of the heart that expel blood 853.
- c. **Partition:** separating the right and left cavities 853.
- d. **Valves:** which regulate the flow of the blood in the heart 853.
- e. **Arteries:** tubes which carry blood away from the heart 113.
- f. **Veins:** tubes which carry blood toward the heart 853.
- g. **Capillaries:** which carry blood from veins to arteries 853.
- h. **Pulse:** distension of arteries by blood pressure 1560.
- i. **Valves in veins:** to prevent back flow of blood 853.

7. THE LUNGS:

- a. **Trachea or windpipe:** the air passage through the throat 1603.
- b. **Bronchi:** the two branches of the windpipe 1603.
- c. **Bronchial tubes:** small tubes branching through the lungs 1603.
- d. **Air sacs:** ends of tubes in lungs 1603.

8. THE BRAIN:

- a. **Cerebrum:** the fore part of the brain 257.
- b. **Cerebellum:** the hind part of the brain 257.
- c. **Medulla Oblongata:** between brain and spinal cord 257.

9. THE EYE: 643.

- a. **Sclerotic coat:** the tough outer coat which forms the cornea.
- b. **Choroid coat:** the dark middle coat which forms the iris.
- c. **Retina:** the delicate inner coat, made up of cells, rods and cones.
- d. **Vitreous humor:** transparent fluid in the main cavity of the eyeball.
- e. **Aqueous humor:** transparent fluid filling the front cavity of the eyeball.
- f. **Crystalline lens:** which focuses the light upon the retina.
- g. **Optic nerve:** which carries sensations to the brain.

10. THE EAR: 572.

- a. **Outer ear:** the part outside the head and the tube leading inward.
- b. **Middle ear:** containing the hammer, the anvil and the stirrup.
- c. **Inner ear:** containing the cochlea and the semicircular canals.
- d. **Tympanic membrane:** between the outer and middle ear.
- e. **Eustachian tube:** the air passage from throat to middle ear.

11. THE TONGUE: a muscular organ within the mouth 1922.

12. THE NOSE: the external organ of the sense of smell 1362.

13. THE SALIVARY GLANDS:

- a. **Parotid:** in front of each ear 1665.
- b. **Submaxillary:** under the lower jaw 1665.
- c. **Sublingual:** under the tongue 1665.

14. THE TEETH:

- a. **Enamel:** the outside of teeth, hardest substance in the human body 1880.
- b. **Dentine:** a bony substance produced from the dermis 1880.
- c. **Pulp:** the living substance inside of teeth 1880

15. THE STOMACH:
1831.

- a. Outer coat: a firm serus membrane.
- b. Muscular coat: with muscular fibers running through it.
- c. Third coat: loosely woven fibrous tissue.
- d. Mucous coat: which contains the mucous glands.
- e. Cardiac glands: those glands near the heart.
- f. Pyloric glands: those glands at the intestines.

16. THE VOCAL CORDS: by which the voice is produced 2026.

17. THE LIVER:

- a. Lobules: with blood and lymph vessels, nerves and bile duct branches running through them. Five sided and composed of cells 1102.
- b. Portal veins: which carry blood through the liver 1102

II. PHYSIOLOGY: 1486.

1. DIGESTION:

- a. Gastric juice: which acts on proteids 1831.
- b. Pancreatic juice: a universal digester 1831.
- c. Pepsin: a ferment contained in the gastric juice 1451.
- d. Enzymes: which digest insoluble foods 620.
- e. Hydrochloric acid: which sets the gastric juice working 1831.
- f. Saliva: a digestive fluid made by the mouth 1665.
- g. Bile: a digestive fluid made by the liver 1102.
- h. Chyme: liquid condition of food when it passes from stomach 1831.
- i. Lymph: a fluid which carries food through walls of capillaries 1126.
- j. Proteids: which are mostly tissue-forming foods 1553.
- k. Carbohydrates: the sugars, starch and cellulose foods 775; 1844; 1811.
- l. Blood: which carries food and water to the tissues of the body 229.
- m. Liver: which performs many offices of digestion 1102.

2. RESPIRATION:

- a. External: which takes place in the lungs 1603.
- b. Internal: which takes place in the tissues of the body 1603.
- c. Air: which supplies oxygen used in respiration 33.
- d. Carbonic acid: the carbon dioxide formed by respiration 332.
- e. Blood: which carries oxygen to the lungs and tissues and carries dioxide away 228.

3. THE SENSES:

- a. Smell: the sense that perceives odors 1768.
- b. Taste: the sense that distinguishes the qualities of foods 1873.
- c. Touch: the sense that distinguishes contact and pressure 1927.
- d. Hearing: the sense by which sounds are distinguished 573.
- e. Sight: the sense that distinguishes the sensations of light 572.

III. HYGIENE:

1. PERSONAL HY-
GIENE: 905.

- a. Importance of good habits: 821.
- b. How to overcome injurious habits: 822.
- c. The transmission of likenesses from parent to child: 867.
- d. Importance of cleaning and filling cavities of teeth: 1880.
- e. The advantages of play: 734.
- f. The benefits of physical education: 1480.
- g. The value of gymnastics: 818.
- h. The evil results of alcohol: 42.
- i. Defects of the eye: 644.
- j. Care in the selection of spectacles: 1793.
- k. The necessity of breathing pure air: 2042.
- l. How the air is made impure: 2042.
- m. Why the air is purer in the country than in the city: 34.
- n. Foods and foodstuffs: 689.
- o. Adulteration of foods: 16.

2. PUBLIC HYGIENE:
905.

- a. Heating and ventilation of public buildings: 856.
- b. Warming and ventilation of rooms: 2042.
- c. Vaccination, how and why it is used: 1997.
- d. The discovery of vaccination: 969.
- e. Work done by Louis Pasteur: 1428.
- f. Why milk should be sterilized: 1824.
- g. Captain Cook's cure for scurvy: 905.
- h. The use of antitoxin in disease: 1726.
- i. The work of white corpuscles in fighting disease: 229.
- j. The causes of contagious diseases: 155.
- k. The germ theory of disease: 761.
- l. The work done by bacteria: 1219.
- m. The success of hygiene in preventing disease: 905.

CHEMISTRY

1. THE DEVELOPMENT OF CHEMISTRY AS A SCIENCE: 376.
 - a. The alchemists: 41.
 - b. Contributions to the science: Boyle 225; Priestley 1405; Cavendish 353; Lavoisier 1037; Dalton 498; Davy 509; Thomson 1906; Volta 2029; Faraday 648; Liebig 1066.
2. PHYSICAL AND CHEMICAL CHANGES: 375; 1231.
 - a. Elements: 375.
 - b. Compounds: 375.
 - c. Mixtures: 375.
 - d. Chemical action: 375.
3. FUNDAMENTAL LAWS AND THEORIES:
 - a. Indestructibility of matter: 375.
 - b. Definite proportion: 376.
 - c. Atomic theory: 376.
 - (1) Atoms: 133.
 - (2) Molecules: 1247.
4. OXYGEN:
 - a. Chemical and physical properties: 1405; 53.
 - b. Spontaneous combustion: 1802.
 - c. Ozone: 1406; 53.
5. HYDROGEN: Chemical and physical properties 903.
6. WATER:
 - a. Composition: 2051.
 - b. Mineral waters: 1232.
 - c. Hard waters: 1072.
 - d. As a solvent: 2051.
7. THE ATMOSPHERE: 34.
 - a. Important Constituents: Oxygen 1405; nitrogen 1353; carbon dioxide 333; moisture as dew 526; rain 1582; clouds 412; frost 720; snow 1773.
8. GAS-VOLUME LAWS:
 - a. Change in volume of gas for change in pressure: Boyle's law 255; isothermal 946.
 - b. Change in volume of gas for change in temperature: Charles' law 371; Gay-Lussac 741.
9. ACIDS, BASES AND SALTS:
 - a. Acids 7; alkali 50; salts: 1668.
 - b. Acid, basic, normal and neutral salts: 1668.
 - c. Commercial production of acids, bases and salts: sulphur 1846; acetylene 6; soda 1777; baking powder 159; tartaric acid 1872.
10. COMPOUNDS OF NITROGEN:
 - a. Ammonia: 64.
 - b. Nitric acid: 1352.
 - c. Nitrates: 1353.
11. SULPHUR AND ITS COMPOUNDS: 1846.
 - a. Electrolytes and ions: 603.
12. ELECTROLYTIC DISSOCIATION:
 - b. Laws of chemical equilibrium and mass action: 603.
 - c. Applications of electrolysis: 603.
13. CHLORINE AND ITS COMPOUNDS: 1667.
 - a. Hydrochloric acid: 392.
 - b. Aqua regia: 353.
 - c. Bleaching: 226.
14. CARBON: 332; 599.
 - a. The allotropic forms of carbon: allotropy 53; graphite 795; coal 414; lampblack 1024; peat 1436.
 - b. Properties of charcoal: 367.
 - c. The oxides of carbon: 333; lime 1071.
 - d. Hydrocarbons: carbon 332; acetylene 6.
 - e. Illuminating gas: 739; natural gas 1306; coke 420; bitumen 221; asphalt 121.
15. THE CHEMISTRY OF FOODS: 689.
 - a. Proteids: 1553; nitrogen compounds 1353; 41.
 - b. Carbohydrates: 332; starch 1811; sugars 1844; cellulose 357; photosynthesis 1479; glucose 775.
 - c. Fats: 689; oils 1376.

16. **FERMENTATION:** {
a. Decay and spoiling of foods: 656; carbon 233.
b. Sterilizing and pasteurizing methods: 1824; 1428.
c. Production of alcohol: 42; vinegar 2022; fermentation 656.
17. **PHOSPHORUS GROUP OF ELEMENTS:** 1475; 53. {
a. Phosphates: 1475.
b. Matches: 1118.
c. Fertilizers: 657.
d. Antimony and bismuth: 80; 220; 1512.
18. **THE ALKALI METALS:** {
a. Compounds of sodium: 1777; salt 1667; borax 246; glass 772; tartaric acid 1872; saltpeter 1667.
b. Baking powders: 159.
c. Soaps: 1774.
d. Gunpowder: 815.
e. Spectroscope and flame tests for metals: 1793; plucker tube 1506.
19. **THE ALKALINE — EARTH METALS:** {
a. Calcium: 305.
b. Marble and lime: 1167; 1071; gypsum 819; Drummond light 555.
c. Calcium carbide: 305; acetylene 6.
d. Mortar and cements: 357; gypsum 819.
20. **METALLURGY OF IRON:** 1211. {
a. Cast iron, wrought iron and steel: 939; 1819; furnace 725; ore-dressing 1235.
b. The Bessemer process: 207; Kelly 995.
c. The open-hearth process: 1820; rolling-mills 1625; foundry 702; flux 687.
d. Crucible steel: 1820.
e. Annealing: 75.
21. **COPPER:** 452. {
a. Metallurgy: 1211.
b. Electrolytic purification: Electrolysis 603; metallurgy 1211.
22. **ORGANIC CHEMISTRY:** 375. {
a. Hydrocarbons: carbon 332; hydrogen 903; petroleum 1462.
b. Alcohols: 42.
c. Acids: 7.
d. Aniline dyes: 73.

PEDAGOGICS

- 1. THE TERM IN ITS LARGER SENSE, CONSIDERING EDUCATION AS AN ASPECT OF LIFE IN GENERAL.**
 - a. As related to environment: 1437.
 - (1) Environment of the age in which one lives.
 - (2) Environment of one's country and community.
 - b. The individual factors: 1437.
- 2. PEDAGOGICS IN THE RESTRICTED SENSE AS RELATED TO THE WORK OF THE SCHOOL:**
 - a. Development of the activities of the child; function of the school: 1437.
 - b. Function of the teacher: 1438.
 - c. Nature of education: 1438.
 - d. Nature of the act of learning: 1438.
 - (1) By observation.
 - (2) By experimentation.
 - (3) By reasoning.
 - e. Teaching the art of stimulating and guiding the self-activity of the child: 1438-9.

THE DIVISIONS OF THE SUBJECT:

- a. History of Education.
- b. Philosophy of Education.
- c. School Organization and Management.
- d. Methodology.

HISTORY OF EDUCATION:

- 1. VALUE OF THE STUDY OF HISTORY OF EDUCATION: 584.**
- 2. FIVE EPOCHS IN EDUCATIONAL HISTORY: 584.**
- 3. EDUCATION MIDDLE AGES: 1695.**
- 4. INFLUENCE OF THE REFORMATION: 1695.**
- 5. INTRODUCTION OF POPULAR SYSTEMS IN GERMANY, HOLLAND, SCOTLAND, FRANCE, ENGLAND AND UNITED STATES: 1695.**
- 6. AIMED AT RELIGIOUS ENDS: 1695.**
- 7. RADICAL DEPARTURE OF MODERN EDUCATION FROM OLD IDEALS.**
 - a. In respect to aim: 584.
 - (1) Progressive ideals.
 - (2) Social efficiency.
 - (3) Vocational training.
 - (4) Extension to all classes.
 - b. In respect to subject matter: 584.
 - (1) Enlargement of curriculum.
 - (2) Development in elementary schools.
 - (3) Technical and vocational studies.
 - c. In method: 585.
 - (1) Psychology as bearing upon method.
 - (2) Mechanical memory-work displaced.
 - (3) Inductive method. (Socialized Rec.; Project: 1877).
 - (4) Appeal to powers, instincts and interests of pupil.
 - (5) Correlation of studies: 460.
 - d. In organization: 585.
 - (1) State systems in place of religious or private control.
 - (2) Development of public school system under state supervision and support.
 - (3) Large funds for educational purposes.
 - (4) Professional training for teachers.

e. Elementary Schools: 1695-96.

- (1) Rise of popular education.
- (2) Influence of Pestalozzi.
- (3) Expansion of curriculum.
- (4) Systems in Germany, France and England.
- (5) Elementary education in the United States.
- (6) Work of Horace Mann.
- (7) Development of the system.

f. Secondary Schools: 1701-02.

- (1) Origin and aim.
- (2) Present system in Germany, France and England.
- (3) In the United States.

g. Academies: 1702.

- (1) Time when they came in.
- (2) A result of what movement.
- (3) How they in large measure took the place of the grammar schools.
- (4) How they differed from grammar schools in purposes.
- (5) Academies as finishing schools and as schools for the training of teachers.
- (6) Introduction of new subjects of study.
- (7) Prominence of science in the academies.

h. High Schools: 1702.

- (1) A development of the academies.
- (2) The first in the United States.
 - (a) The English High School of Boston: 1702.
- (3) How they differed from academies.
- (4) Their public character.
- (5) High Schools as a product of the idea that secondary education should be supported and controlled by the public.
- (6) Their spread over the United States.
- (7) Their number at present.

i. University Education: 1886.

- (1) Origin and organization of the modern university: 1886.
- (2) History of universities of Europe: 1887.
- (3) The first American Universities:
 - (a) Harvard: 1888.
 - 1 The time of its foundation.
 - 2 How it received its name.
 - (b) William and Mary College: 2088.
 - 1 Time of its foundation.
 - 2 Men trained here in the Colonial period.
 - (c) Yale: 2120.
 - 1 How it received its name.
 - 2 Time and occasion of its establishment.
- (4) Establishment of the State Universities: 1888.
 - (a) Period of establishment.
 - (b) Government aid in establishing.
 - (c) First state universities.
 - (d) The University Extension movement.
 (See Index under University).

j. Rural Schools: 1697.

- (1) Character and scope in the United States.
- (2) Course of Study.
- (3) Organization and government.
- (4) Support: 1698.
- (5) Teachers: 1698.
- (6) Buildings: 1699.
- (7) Improvement of Rural Schools: 1699.
- (8) Consolidation of Schools and transportation of pupils: 1700.
- (9) Conventions of School-officers: 1700.

- (10) Rural High Schools: 1700.
- (11) Educational Extension: 1701.
- (12) Bibliography: 1701.
- k. Summer Schools: 1702.**
 - (1) Chautauqua type.
 - (2) Summer-session of Universities, etc.
 - (3) Credit toward degree for work done.
 - (4) Training of teachers.
- l. Schools for Defectives: 1703.**
 - (1) Methods for teaching the deaf:
 - (a) Sign language.
 - (b) Manual alphabet.
 - (c) Direct or oral method.
 - (2) Methods for the blind:
 - (a) Raised letters.
 - (b) Braille system.
 - (3) Methods for feeble-minded:
 - (a) Industrial and kindergarten training.
- m. Schools of Commerce: 1703.**
 - (1) Private commercial schools: 1704.
 - (2) Public High Schools: 1704.
 - (3) Commercial Schools in Europe: 1703.
 - (4) Commercial courses in American Colleges and Universities: 1704.
- n. Vacation Schools: 1997.**
 - (1) An extension of public school system.
 - (2) How conducted.
 - (3) Study and recreation combined.
 - (4) Beneficial results.
- o. Industrial Schools: 924.**
 - (1) A substitute for apprenticeship.
 - (2) Advantages over apprenticeship.
 - (3) German system.
 - (4) Industrial training in public schools.
 - (5) Schools of industrial design.
 - (6) First public industrial school in U. S.
- p. Continuation of Schools: 448.**
 - (1) Object of continuation work.
 - (2) Vocational training.
 - (3) Work of Y. M. C. A.
 - (4) Continuation schools in Germany, France and other countries.
- q. Excursion Schools: 640-41.**
 - (1) Nature-study excursions.
 - (2) Out-door geography work.
 - (3) Historical work.
 - (4) Visits to public institutions.
 - (5) Excursion Schools in Germany.
 - (6) Difficulties and advantages in excursion work.
- r. Technical Schools: 1879.**
- s. Trade Schools: 1931.**
 - (1) Nature and object of trade-schools.
 - (2) When and where first founded.
 - (3) Courses of instruction.
 - (4) Privately endowed.
 - (5) Names of principal trade-schools.
- t. Kindergarten: 1002-03.**
 - (1) Outgrowth of great reform movement by Froebel.
 - (2) Underlying principles.
 - (3) Methods based on child-nature.
 - (4) Results based on reports of teachers.
 - (5) Thorough training of teachers essential.
 - (6) First establishment and wide growth of kindergartens.

- u. The School Garden: 1690-91.**
 - (1) Outgrowth of school-work.
 - (2) Relation to nature-study.
 - (3) Relation to geography.
 - (4) Relation to esthetics.
 - (5) Relation to the home.
 - (6) Educative effect on pupils.
 - (7) Value to teachers.
 - (8) School gardens in Europe.
 - (9) Relation to manual training.
- v. Correspondence Schools: 461.**
- w. American Colleges: 422:23.**
 - (1) Courses of Study.
 - (2) Conditions of admission.
 - (3) Elective studies.
 - (4) Founded to train ministers.
 - (5) Aim greatly broadened.
 - (6) College Fraternities.
 - (7) Athletics.
 - (8) Attendance, instructors and endowments.
 - (9) College entrance-examination board.
- x. Going to College: 423-24.**
 - (1) Who should go.
 - (2) Value of college course.
 - (3) Result as related to practical life.
 - (4) Selection of college.
 - (5) Universities as compared with small colleges.

II. PHILOSOPHY OF EDUCATION:

1. PSYCHOLOGY FOR TEACHERS:

- a. Its place in the new education: 1557.
- b. Development by Herbart: 1557.
- c. Influence in modifying the method of teachers: 1557.
- d. Inductive method: 1557.
- e. Analytic method instead of synthetic; word method in teaching reading: 1558.
- f. Laws of memorizing and habit: 1558.
- g. Physiological psychology: 1558.

2. APPERCEPTION:

- a. Views of Leibniz, Kant, Herbart: 83.
- b. Interpreting of perceptions by the mind: 84.
- c. Consequences of this principle on education: 84.
- d. How it affects the work of the teacher: 84.
- e. Importance as related to course of study: 84.
- f. Relation of apperception to interest: 85.

3. ASSOCIATION OF IDEAS:

- a. Meaning of the term: 123.
- b. Views of Locke and Hartley: 124.
- c. James statement of the laws of association: 124.
- d. Conditions affecting the law of association: 125.

4. FEELING:

- a. Use of the term subjective: 652.
- b. Relation between feeling and cognition: 652.
- c. Conditions of feeling: 652.
- d. Function of the emotions: 653.
- e. Organic and external expressions of emotions: 653.

5. INTEREST:

- a. Explanation of the use of the term: 931.
- b. Discipline as an educational factor: 931.
- c. Opposing view of Rousseau: 931.
- d. Theory of Herbart: 931.

- e. Influence of Rousseau, Herbart and Froebel on modern education: 932.

6. CHILD STUDY:

- a. Study of mental and physical nature of children in modern education: 384.
- b. Work of Rousseau, Pestalozzi, Herbart and Froebel: 384.
- c. Culture-epoch theory of Ziller: 384.
- d. Theory of G. Stanley Hall: 385.
- e. Preyer's "The soul of the child": 385.
- f. Learning by doing: theories of Dewey and Angell: 385.
- g. Development of perception: 385.
- h. Place of play in education: 385.

7. ADOLESCENCE:

- a. Transition from childhood to adult life: 14.
- b. Physical changes characteristic of this period: 14.
- c. Mental and emotional traits: 15.
- d. Late adolescence period of change from dependence to independence: 15.
- e. Called the stress and strain period: 15.
- f. Professor James' advice: 15.
- g. Practical problem of the educator: 15.

8. SELF ACTIVITY:

- a. Instincts, impulses and interests: 1720.
- b. Emphasized by Froebel school: 1720.
- c. Relation of the will: 1720.
- d. Self activity basis of the will, effort and interest: 1720.
- e. How developed: 1720.
- f. How to be treated by teacher: 1720.

9. HABIT:

- a. Definition of term: 821.
- b. How distinguished from instinct: 821.
- c. How habits are established: 821.
- d. Relation to brain and nerve action: 821.
- e. Function and value of habit: 821.

10. MENTAL DISCIPLINE:

- a. Value in developing power of mind: 1203.
- b. Disciplinary value of certain studies: 1204.
- c. Opposing views of Herbart: 1204.
- d. Discipline a factor in choosing school curriculum: 1204.
- e. Value of correlation: 1205.

11. MEMORIZING:

- a. Place in early system of education: 1201.
- b. Change of method in modern education, but aim the same: 1201.
- c. Memory differs in degree and kind: 1201.
- d. Methods of memorizing mechanical and associative: 1201.
- e. Mnemonic systems: 1201.
- f. Logical associations most effective: 1201.

III. SCHOOL ORGANIZATION AND MANAGEMENT:

1. WHAT THE SUBJECT INCLUDES: 1691.

2. MATTERS CONCERNING THE SCHOOL BUILDING:

- a. The erection of the school building: 1699.
 - (1) Selection of the proper site.
 - (2) Aid to be obtained from the state in designing
- b. School sanitation: 1691-92.
 - (1) What is included in the subject: 1691.
 - (2) Heating and ventilation: 1692.
 - (3) Problem of providing for sufficient light: 1692.
 - (4) Need of having adjustable seats and desks: 1692.

3. ORGANIZATION AND CONDUCT OF THE SCHOOL:

- a. The course of study:
 - (1) Correlation of the course of study: 460.
 - (a) What is meant by correlation: 460.
 - (b) The views of Herbart, Froebel and Dewey: 460.
 - (c) Subjects which may most easily be correlated: 461.
- b. Discipline and punishment:
 - (1) Theory of punishment in general: 1562.
 - (2) The proper aim in punishment in school: 1563.
 - (3) Partial solution of the problem:
 - (a) In activity and interest of children in the school: 1563.
 - (b) In self-government: 1563.

4. THE SCHOOL GARDEN: 1504, 1690.

- a. Relation of the school garden to regular school study: 1690.
- b. Values to be realized by use of garden: 1691.
- c. Relation of the garden to the home of the children: 1691.
- d. Manual training in the care of the school garden: 1691.
- e. The garden in the teaching of nature study: 1690.

5. PROBLEMS OF SPECIAL TYPES OF SCHOOLS:

- a. Rural Schools: 1697.
- b. Summer Schools: 1702.
- c. Schools for Defectives: 1703.

IV. METHODOLOGY.

1. METHOD IN THE TEACHING OF ARITHMETIC:

- a. The Subject-Matter of Arithmetic:
 - (1) The essential subjects to be taught in arithmetic: 97.
 - (2) Why it is advisable to drop certain subjects commonly taught: 97.
 - (3) The test of a good topic: 98.
 - (4) What some of the new valuable subjects are: 98.
 - (5) The change in recent text-books: 98.
- b. The right aim in teaching arithmetic: 98.
- c. The significance of the answer to a problem:
 - (1) How far the answer should be emphasized: 98.
- d. Value of interest in a problem:
 - (1) The effect of interest on concentration of attention: 98, 932.
- e. Arithmetic teaching in the first two grades:
 - (1) Informality of the subject in the first year: 98.
 - (a) Reasons for this: 98.
 - (2) How counting should be taught and utilized: 98.
 - (3) Measuring and what it should involve in the first two years: 98.
 - (4) Teaching of fractions:
 - (a) Why teach them early: 98.
 - (b) Devices to make the steps clear: 98.
 - (5) Method in subtraction: 98.
- f. Arithmetic in the third, fourth, and fifth grades:
 - (1) Reduction, ascending and descending: 99.
 - (a) To what this should be confined: 99.
 - (2) Decimal fractions: 99.
 - (a) When decimal fractions should be taught: 98.
 - (b) The best methods of teaching multiplication and division of decimals: 99.
- g. Arithmetic in the sixth and seventh grades.
 - (1) Where the main value in the arithmetic work here lies: 99.
 - (2) Importance of correlation: 99.
 - (3) How to teach percentage: 99.
 - (4) Use of equation in arithmetic: 99.
 - (5) Place and value of oral work: 99.
 - (6) How to emphasize the thought side of a problem: 99.
 - (7) Confusion arising from home help: 100.

2. METHOD IN THE TEACHING OF GEOGRAPHY:

- a. The scope of the subject of geography:
 - (1) Definition: 745.
 - (2) How geography differs from physiography: 746, 1482.
- b. Geography, how divided:
 - (1) Physical geography: 745.
 - (2) Political geography: 745.
 - (3) Commercial geography: 745.
 - (4) Medical geography: 745.
 - (5) Oceanography: 745.
- c. Geography, its relation to the sciences:
 - (1) Geology: 747.
 - (2) History: 747.
 - (3) Astronomy: 127.
- d. Geography in the first three grades:
 - (1) The aim here: 746.
 - (2) Geography as incidental to the study of primitive life and nature study: 746, 1308.
- e. Geography in the third and following grades:
 - (1) Geography as a separate subject here: 746.
 - (2) Home geography as the first study taken up; nature study in this: 746, 1308.
 - (3) Importance of emphasis on the causal idea: 746.
 - (4) How the new geography differs from the old: 746.
 - (5) Dynamic character of geography when properly taught: 746.
 - (6) Aids in geography teaching:
 - (a) The magnet: 1145; compass, 435; barometer, 174; dial, 526; thermometer, 1900.
 - (7) The necessity of laboratory and field work: 746.
 - (8) Sources of information: 746.

Note: Refer to Outline on Geography.

3. METHOD IN THE TEACHING OF HISTORY:

- a. The values of history to be realized: 876.
 - (1) Main value lies in helping people to understand the present.
 - (2) Instruction which history furnishes in way of human life and character.
 - (3) Furnishing of ideals of conduct.
- b. Why the history of one's own country is most valuable: 876.
- c. Beginning of history work in the third grade: 876.
 - (1) Use of history stories here.
 - (2) Value of skillful story telling.
- d. Use of American history as the subject for elementary history: 876.
 - (1) The divisions of the subject into periods for purposes of teaching.
 - (a) Period of exploration on sea and land.
 - (b) Period of settlement and colonial development to 1763.
 - (c) The struggle with England, the war for independence, the adoption of the Constitution.
 - (d) The growth of the country under the constitution.
- e. How to make the history work most valuable: 876.
 - (1) Select the more interesting and striking phases.
 - (2) Make use of biography to a great extent.
 - (3) Supply by reference books or otherwise, material on customs of the people.
 - (4) Use source materials.
 - (5) Do not make use of long chronological tables.
 - (6) Use charts to get view of contemporary history and historical order: See History Charts: 877.
 - (7) Use population maps and other devices.
 - (8) In upper grades encourage independent study.

Note: Refer to Outline on History.

4. METHOD IN THE TEACHING OF LANGUAGE:

- a. What is included in language work in school: 1026.
 - (1) The broad meaning.
 - (2) The narrower meaning.

- b. The two general problems in language teaching: 1026.**
 - (1) To extend child's power to use language.
 - (2) To correct his language errors.
- c. Experience at base of all language work:**
 - (1) Varieties of experience to be worked with: 1026.
 - (2) What good language work does for child experience: 1026-7.
- d. Method in oral and written language: 1027.**
 - (1) Means suggested to assist written work.
 - (2) How the teacher may improve the oral English of pupils:
 - (a) Encourage children to speak freely on interesting subjects.
 - (b) Incidental suggestions correcting mistakes when made.
 - (c) Get pupils to give conscious attention to forms of speech.
 - (3) Formal correction of language errors in upper grades: 1027.
 - (a) Steps in formal correction:
 - 1. Errors recognized.
 - 2. Correct form determined by means of grammar.
 - 3. Correct form made habitual by drill.
- e. Grammar:**
 - (1) Formal grammar not so important as formerly: 1027, 790.
 - (2) Dependence for correct English on correct use without many rules: 1027.
 - (3) Lack of formal grammar in first six years of school: 1027, 790.
 - (4) Grammar in the seventh and eighth grades: 1027, 791.
 - (a) Pupils usage made the basis for inductive study: 1027, 791.
 - (b) Mainly a matter of classification essential to guidance of oral and written expression: 1027.
 - (c) Language treated as an art, not a science: 1027.
- f. Foreign languages: 1027, 791.**
 - (1) Oral work: 1028.
 - (2) Written composition: 1028.

5. METHOD IN THE TEACHING OF MANUAL TRAINING:

- a. What manual training in the wide sense includes: 1162.**
 - (1) Shop and desk work.
 - (2) Domestic science.
 - (3) Domestic art.
- b. Value in manual training:**
 - (1) Giving of useful skill and knowledge: 1163.
 - (a) Commercial value of manual dexterity.
 - (2) Development of motor control: 1163.
 - (3) Development of observation and judgment: 1163.
 - (4) Values on artistic side: 1163.
 - (5) Object of stick laying, paper folding, tracing, clay modelling and weaving: 1164.
- c. Desk and shop work:**
 - (1) Desk work in early grades: 1163.
 - (a) Use of ordinary desks: 1165.
 - (b) Working outline lessons for 23 weeks: 1164.
 - (c) Basketry: 179.
 - (d) Drawing: 551.
 - (2) Shop work in upper grades:
 - (a) Materials used: 1165.
 - (b) Tools required: 1163, 1165.
- d. Domestic Art: 542.**
 - (1) What is included in domestic art.
 - (2) Special values in the subject.
 - (3) The development of taste and skill.
- e. Domestic Science:**
 - (1) Branches taught: 542.

(2) Where the emphasis is laid in teaching domestic science: 542.

(3) Domestic science in the upper grades: 542.

f. Industrial schools in relation to manual training: 924.

6. METHOD IN THE TEACHING OF MUSIC:

a. The primary purpose of music teaching in school: 1286.

b. Means of accomplishing the purpose: 1286.

(1) Experience: imitative singing.

(2) Classification of ideas and application of musical ideas: sight singing.

(3) Use of concrete ideas in musical composition.

(4) Use of musical instruments.

c. Method in the first phase of music teaching.

(1) Accurate imitation of what is heard and holding it in memory: 1286.

(2) Classification of ideas: 1287.

(a) Ideas dealing with interpretation of music.

(b) Ideas dealing with structure.

(c) What is taught under each.

(3) The main difficulty in forming general musical ideas: 1287.

(4) Importance of doing what is observed: 1287.

(5) How to clarify ideas obtained.

(a) Various devices.

d. Method in the second and third phases.

(1) How the process in the second phase is the reverse of that in the first: 1287.

(2) The development of ability to conceive of and reproduce motives: 1288.

(a) Value of instrumental music here.

(b) Need of careful guidance of pupils.

(c) Use of pianola and similar instruments.

e. General assemblies and festivals in teaching of music.

(See article on The School-Song, 1692.)

(1) Occasions for festivals.

(2) Festivals as furnishing motives for music work.

(3) Combination of music and the drama in the festival.

f. Musical Notation: 1288.

(a) Art of representing tones by printed characters.

(1) Structural Ideas:

(a) Pulse-grouping: 1289.

(b) Tone-duration: 1289.

(c) Pitch-representation: 1290.

(d) Key-signature: 1290.

(e) How indicated in written music: 1290.

g. Harmony.

(1) Chord: 838.

(2) Tonality: 839.

(3) Melody: 840.

(4) Key: 840.

(5) Scale: 840.

h. Form in Music.

(1) Mode of expression: 694.

(a) Vocal and instrumental.

(b) Choral and orchestral.

(2) Function: 694.

(a) Secular.

(b) Ecclesiastical.

(c) Religious.

(3) Character: 694.

(a) Lyric.

(b) Dramatic.

(c) Programmatic.

(4) Structural ordering: 694.

- (5) Melodic material: 694.
- (6) Illustrative examples: 695, 696.

i. Religious Music: 1284.

- (1) Essential characteristics: 1285.
- (2) Importance of association: 1285.
- (3) Why secular music is inappropriate for religious use: 1286.
- (4) Type of effective religious music: 1286.
 - (a) Long used for religious purposes.
 - (b) Employing form not adapted to secular use.
 - (c) Effective musically.

j. School Song:

- (1) Importance of careful selection: 1692.
- (2) Imitative and dramatic period: 1692.
 - (a) Model selections, with suggestions for teaching: 1693.
 - (b) First step: 1693.
 - (c) Advanced step: 1693.
 - (d) Teaching points to gain expressive use of song: 1693.
- (3) Investigative period: 1694.
 - (a) First step; use of descriptive songs.
 - (b) Illustrations.
 - (c) Advanced step; songs to promote sight-singing.
 - (d) Illustrations.
- (4) Constructive period: 1694.
 - (a) Work in upper grades.
 - (b) First step.
 - (c) Advanced step.
 - (d) Illustration.
- (5) Work in High School: 1695.
 - (a) Difficulties and how to meet them; chorus work.
 - (b) Appropriate selections.
- (6) General assemblies and festivals: 1695.
 - (a) Festivals.
 - (b) Suggestions for this class of work.

k. Musical Tones: 8.

- (1) The musical scale: 9.

7. METHOD IN THE TEACHING OF NATURE STUDY:

a. Nature Study as a school subject: 1307.

- (1) What nature study includes.
(See outline on Nature Study in "The Student's Manual.")
- (2) Basis of nature study in interests and activities of children.
- (3) Importance of nature study in early school years.
- (4) Relation of nature study to school science.
 - (a) Function of nature study as an introduction to science.
 - (b) How nature study gradually differentiates in the upper grades and high school into geography, botany, physics, etc.: 1308.

b. Purposes in teaching the subject: 1308.

- (1) Development of perceptive faculties, observation, understanding, memory, judgment and language.
- (2) Development of genuine love of nature.
- (3) Extend the child's range of experience.

c. The material to be used: 1308.

- (1) Principles involved in selection.
- (2) Materials for study in early grades according to season of the year.

d. The key to method: 1309.

- (1) Emphasis on function.
- (2) Continual use of problems both in beginning and continuing study.

e. Utilization of vacation experiences of children: 1308.

- (1) Subjects for study and discussion.

(2) Material collected during summer.

(a) The school museum.

f. Nature Study Excursions: 640-41.

(1) Main purposes:

(a) To bring into contact with outside world.

(b) To give direct experience.

(c) To give reality to study.

(d) To make work more objective and concrete.

(2) Necessity of seeing objects in their natural situations.

(3) Interest in work given by excursions.

(4) How the advantages outweigh the disadvantages.

g. The camera in nature study: 1309.

(1) Value of camera in excursions.

(2) What the camera can do in nature study.

(3) The kind of training which use of camera gives.

(4) The camera as a source of material for study.

h. The school garden in nature study: 1690.

8. METHOD IN THE TEACHING OF PENMANSHIP:

a. The three typical systems of handwriting: 1445.

(1) The slant, the medial, and the vertical.

b. Main requirements in teaching penmanship: 1445.

(1) Legibility.

(2) Speed.

(a) Less demand for this than formerly.

(3) Ease.

(4) Individuality.

c. The first years of penmanship work: 1445.

(1) Little or no penmanship in the first year of school.

(2) The first work.

(a) Use of the blackboard.

(b) Seat work with pencil.

(c) Necessity of practice.

(d) Use of dictation exercises.

(e) The method emphasizing accuracy at first.

(f) Method emphasizing form first with accuracy to follow.

(3) After the first, personal variations from the model allowable.

d. Penmanship made a special subject after the sixth grade: 1446.

e. The important considerations in the seventh and eighth grades: 1446.

f. Individual work in correction: 1446.

9. METHOD IN PHYSICAL EDUCATION.

a. What physical education includes: 1480.

(1) The more general meaning:

(a) Physical examination of pupils and students.

(b) Personal direction in matters of health.

(c) Class instruction in hygiene.

(d) Gymnastics and athletics.

(2) The more technical meaning.

b. Increased importance of physical education: 1481.

(1) Requirements of healthful and successful living.

(2) Lack of physical exercise and training in modern conditions of living.

c. Physical education as a means of insuring normal development: 1481.

(1) The furnishing of opportunity.

(2) By furnishing incentive.

d. Means of physical education.

(1) Plays, dances, and games: 734-35.

(See the psychology of play under "Child-Study," p. 385.)

(a) Importance of these compared with gymnastics: 817, 1841.

- (b) Elements and opportunities for these supplied by school subjects.
- (2) Athletics: 131.
- (3) Gymnastics: 817.
 - (a) How formal gymnastics lack in educational values: 1841.
 - (b) Proper use of gymnastics as corrective: 817.
- e. The program in physical culture:
 - (1) The kindergarten and first years of elementary school: 1481, 1003.
 - (a) Character of exercises.
 - (b) No activities requiring fine adjustments.
 - (c) Place of marching and drill, climbing, swinging movements, games of skill.
 - (2) Grammar grades: 1481.
 - (a) Prominence of games and exercises requiring skill.
 - (b) Group games.
 - (3) Physical education in early adolescence: 1481.
 - (a) Consideration of individual weaknesses.
 - (b) Emphasis on use of apparatus.

10 METHOD IN THE TEACHING OF READING:

- a. Divisions according to aspects emphasized: 1590.
 - (1) Beginning reading.
 - (2) Thought-reading.
 - (3) Appreciative reading.
- b. Beginning Reading: 1590.
 - (1) What is involved in mastering mechanics of reading:
 - (a) The new and strange printed forms.
 - (b) Oral words.
 - (c) Experiences already within his command.
 - (2) The main effort of the teacher in beginning reading.
 - (3) The two general methods of approach.
 - (a) The thought-method.
 - 1. What is involved.
 - 2. The main reliance in this method.
 - (b) Phonetic method:
 - 1. Emphasis on pronunciation units which make up words.
 - 2. The theory at the base of this method.
 - 3. Artificial character of phonetic methods.
 - 4. The main phonetic methods.
 - (c) Combination of the phonogram method and the thought-method is the best.
 - (d) The final aim.
- c. Thought Reading: 1591.
 - (1) To what the term is applied.
 - (2) Purpose in thought reading.
- d. Appreciative Reading: 1591.
 - (1) Meaning of "appreciative reading."
 - (2) Purpose.
- e. Special reading methods in school and special purpose of each: 1591.
 - (1) Oral reading.
 - (2) Silent reading.
 - (3) Individual reading.
 - (4) Concert reading.
 - (5) Prepared reading.
 - (6) Sight reading.
 - (7) Intensive reading.
 - (8) Extensive reading.
 - (9) Supplementary reading.

AGRICULTURE

The study of Agriculture holds a place of large and growing importance, both in our schools and in the work of the successful farmer of today. This outline shows the abundant material contained in THE NEW STUDENT'S REFERENCE WORK, in aid of this study. For the convenience of those who wish further information in any special line, reference is given to Farmers' Bulletins, issued by the government. These Bulletins are sent free to any one who applies for them. Address, Secretary of Agriculture, Washington, D. C.

1. STUDY OF THE SOIL:

- a. Clay soil: in which the earth particles are very small and hold together 1778; 406.
- b. Sandy soil: in which the particles are larger and loosely held together 1673.
- c. Loam: a mixture of sand and clay 1778.
- d. Alluvium: soil formed by rivers, bottom land 53.
- e. Humus: decayed organic matter in the soil 898; 1165.
- f. Earthworms: how they make humus in the soil 575.
- g. Mulch: a loose top dressing to prevent loss of moisture 331; 1275.
- h. Capillarity in soils: rising of water through the soil particles 330.
- i. Subsoil: uncultivated soil below the upper layer 1842.
- j. Dry farming: method of farming with little rainfall 942.
- k. Transpiration: amount of water needed by plants 1936.

Consult:

Farmers' Bulletin No. 257 Soil Fertility.
Farmers' Bulletin No. 266 Management of Soils to Conserve Moisture.
Farmers' Bulletin No. 245 Renovating Wornout Soils.
Farmers' Bulletin No. 150 Clearing New Land.

2. FERTILIZING THE SOIL:

- a. Nitrogen: plant food consumed mostly in growing 1353.
- b. Phosphate: plant food consumed mostly in fruiting 1475.
- c. Potash: plant food consumed mostly in seeding and maturing 1537; Ammonia 64; Saltpeter 1667.
- d. Lime: used for correcting the acidity of soils 1071; 658; Marl 1173.
- e. Manure: used for getting plant food and humus into the soil 1165.
- f. Fertilizers: plant foods artificially and commercially prepared 657.
- g. Benefit of live stock on the farm: 1828.
- h. Compost and green manures: Cowpeas 470; Pea 1432; Alfalfa 46; Rice 1610.
- i. Nitrogen gathering crops: 1353; Bacteria 154.
- j. Root tubercles or leguminous plants: 1633.
- k. Absorption: why plant food should be soluble in water 5.
- l. Rotation of crops: benefits of rotation 1636.

Consult:

Farmers' Bulletin No. 44 Commercial Fertilizers.
Farmers' Bulletin No. 192 Barnyard Manure.
Farmers' Bulletin No. 278 Leguminous Crops for Green Manuring.
Farmers' Bulletin No. 48 The Manuring of Cotton.
Farmers' Bulletin No. 77 Liming of Soils.
Farmers' Bulletin No. 88 Alkali Land.

Plan for Finding What Plant Food Element is Lacking in the Soil.

Lay off 9 plats in a field, 2 rods by 8 rods. Apply a different fertilizer to each plat. Plant corn in each one, and compare the growth and yield of the plats. A more liberal application of fertilizers is used in making this test than would be recommended for general fertilizing.

A chemical analysis of a soil will give valuable information of a general nature regarding the soil; but it cannot be relied upon to determine just what fertilizers should be used. The only way to find out what fertilizers to use on a particular piece of ground is by actual experiment.

	2 rods	2 rods	2 rods	2 rods	2 rods	2 rods	2 rods	2 rods	2 rods	
8 rods	Potash 8 lbs.	Acid Phosphate 25 lbs.	Nitrogen 20 lbs.	No Fertilizer	Potash 8 lbs. Acid Phos. 25 lbs.	Potash 8 lbs. Nitrate 20 lbs.	Acid Phos. 25 lbs. Nitrate 20 lbs.	Nitrogen Phos. Acid and Nitrogen	Lime	8 rods

3. DRAINAGE AND IRRIGATION:

- a. Tile and ditch drainage: 549.
- b. Water-table in the soil and how it affects crops: 549.
- c. The reclamation of swamp lands: 1592.
- d. Tile drainage of irrigated land: 942.

Consult:

Farmers' bulletin No. 263 Practical Information for Beginners in Irrigation.
Farmers' Bulletin No. 187 Drainage of Farm Lands.
Farmers' Bulletin No. 153 How to Build Small Irrigation Ditches.
Farmers' Bulletin No. 371 Drainage of Irrigated Lands.
Farmers' Bulletin No. 138 Irrigation in Field and Garden.

4. SEEDS AND SEED SELECTION:

- a. Seeds: names of different parts of a seed 1718.
- b. Seed dispersal: how seeds are scattered 1717.
- c. Spores: the reproductive cells of seedless plants 1803.
- d. Germination of seeds: escape of the young plant from its seed case 760.
- e. Embryo: the young plantlet within the seed 611.
- f. Endosperm: the food in the seed used by the young plant 614.
- g. Seed selection: advantages of practicing seed selection; 31.

Consult:

Farmers' Bulletin No. 306 Dodder in Relation to Farm Seeds.
Farmers' Bulletin No. 253 The Germination of Seed Corn. (Test for Germination.)

5. VARIOUS FIELD AND GARDEN CROPS:

- a. Corn: 457.

Consult:

Farmers' Bulletin No. 199 Corn Growing.
Farmers' Bulletin No. 229 The Production of Good Seed Corn.
Farmers' Bulletin No. 313 Harvesting and Storing Corn.

- b. Cotton: 464; Cottonboll weevil 465; Georgia 753.

Consult:

Farmers' Bulletin No. 217 Essential Steps in Securing an Early Cotton Crop.
Farmers' Bulletin No. 235 Advantage of Planting Heavy Cotton Seed.
Farmers' Bulletin No. 314 A Method of Breeding Early Cotton to Escape Boll-weevil Damage.

Farmers' Bulletin No. 333 Cotton Wilt.

- c. Grains and Grasses: Wheat 2073; Oats 1368; Rye 1650; Buckwheat 283; Barley 172; Flax 682; Linseed 1077; Rice 1610; Sorghum 1782; Millet 1227; Grass 795.

Consult:

Farmers' Bulletin No. 250 The Prevention of Wheat Smut and Loose Smut of Oats.

Farmers' Bulletin No. 132 Insect Enemies of Growing Wheat.

Farmers' Bulletin No. 300 Some Important Grasses and Forage Plants for the Gulf Coast Region.

Farmers' Bulletin No. 219 Lessons from the Grain Rust Epidemic of 1904.

Farmers' Bulletin No. 274 Flax Culture.

Farmers' Bulletin No. 27 Flax for Seed and Fiber.

Farmers' Bulletin No. 322 Milo as a Dry-land Grain Crop.

Farmers' Bulletin No. 110 Rice Culture in the United States.

Farmers' Bulletin No. 101 Millets.

Farmers' Bulletin No. 135 Sorghum Sirup Manufacture.

Farmers' Bulletin No. 279 A Method of Eradicating Johnson Grass.

Farmers' Bulletin No. 248 The Lawn.

d. The Legumes: Nitrogen gathering crops 1353; Alfalfa 46; Cow-peas 470; Clover 413; Pea 1432; Peanut 1434.

Consult:

Farmers' Bulletin No. 339 Alfalfa.

Farmers' Bulletin No. 194 Alfalfa Seed.

Farmers' Bulletin No. 373 Irrigation of Alfalfa.

Farmers' Bulletin No. 224 Canadian Field Peas.

Farmers' Bulletin No. 260 Seed of Red Clover and Its Impurities.

Farmers' Bulletin No. 323 Clover Farming on the Sandy Jack Pine-lands of the North.

Farmers' Bulletin No. 361 Meadow Fescue; Its Culture and Uses.

Farmers' Bulletin No. 315 Progress in Legume Inoculation.

Farmers' Bulletin No. 356 Peanut.

Farmers' Bulletin No. 318 Cowpeas.

Farmers' Bulletin No. 372 Soy Beans.

e. Tobacco: 1918.

Consult:

Farmers' Bulletin No. 83 Tobacco Soils.

Farmers' Bulletin No. 82 The Culture of Tobacco.

Farmers' Bulletin No. 60 Methods of Curing Tobacco.

Farmers' Bulletin No. 343 The Cultivation of Tobacco in Kentucky and Tennessee.

f. Hops: 885; Beer 193.

Consult:

Farmers' Bulletin No. 304 Growing and Curing Hops.

g. Grapes: 794; Wine making 2094.

Consult:

Farmers' Bulletin No. 156 The Home Vineyard.

Farmers' Bulletin No. 113 Grape Growing in the South.

Farmers' Bulletin No. 175 Home Manufacture and Use of Unfermented Grape Juice.

Farmers' Bulletin No. 30 Grape Diseases on the Pacific Coast.

Farmers' Bulletin No. 284 Insect and Fungous Enemies of the Grape East of the Rocky Mountains.

h. Miscellaneous: Potato 1537; Sweet Potato 1855; Yam 2120; Tomato 1921; Onion 1382; Asparagus 121; Cucumbers 485; Melons 1291; Pea 1432; Gooseberry 781; Cranberry 473; Strawberry 1837; Raspberry 1587; Currant 488; Mushrooms 1284; Transplanting Vegetables 1937.

Consult:

Farmers' Bulletin No. 62 Marketing Farm Produce.

Farmers' Bulletin No. 255 The Home Vegetable Garden.

Farmers' Bulletin No. 324 Sweet Potatoes.

Farmers' Bulletin No. 282 Celery.

Farmers' Bulletin No. 220 Tomatoes.

Farmers' Bulletin No. 198 Strawberries.

Farmers' Bulletin No. 61 Asparagus Culture.

Farmers' Bulletin No. 176 Cranberry Culture.

Farmers' Bulletin No. 213 Raspberries.

Farmers' Bulletin No. 254 Cucumbers.

Farmers' Bulletin No. 52 The Sugar Beet.

Farmers' Bulletin No. 204 The Cultivation of Mushrooms.

6. FRUIT RAISING AND PLANT PROPAGATION:

a. Horticulture: 887; cross-pollination 482; 1518; Propagation of plants 1552; Plant-breeding 1500; Grafting 789; Layering 1040; Pruning 1555; Hotbed and cold-frame 888; Transplanting 1937; Fruit 721; Apple 85; Peach 1434; Cherry 377; Plum 1506; Sloe or wild plum 1767; Pear 1435; Quince 1575; Paw-Paw 1432; Orange 1388; Lemon 1052; Lime 1072; Citron 402; Grape Fruit 795; Shaddock 1731; Figs 661; Persimmon 1456; Pineapple 1492; Banana 165; Almond 54; Pecan Hickory Nut 872; Chestnut 379; Hazel Nut 853; Walnut 2038; Butternut 297; Mango 1158; Date 505.

b. The canning industry: 323.

Consult:

- Farmers' Bulletin No. 154 Home Fruit Garden: Preparation and Care.*
Farmers' Bulletin No. 293 Use of Fruit as Food.
Farmers' Bulletin No. 104 Notes on Frost.
Farmers' Bulletin No. 113 The Apple and How to Grow It.
Farmers' Bulletin No. 291 Evaporation of Apples.
Farmers' Bulletin No. 33 Peach Growing for Market.
Farmers' Bulletin No. 140 Pineapple Growing.
Farmers' Bulletin No. 238 Citrus Fruit Growing in the Gulf States.
Farmers' Bulletin No. 332 Nuts and Their Uses as Food.

7. POULTRY:

Poultry: 1540; Duck 557; Goose 780; Turkey 1955; Guinea Fowl 812.

Consult:

- Farmers' Bulletin No. 287 Poultry Management.*
Farmers' Bulletin No. 236 Incubation and Incubators.
Farmers' Bulletin No. 51 Standard Varieties of Chickens.
Farmers' Bulletin No. 200 Turkeys.
Farmers' Bulletin No. 64 Ducks and Geese.
Farmers' Bulletin No. 234 The Guinea Fowl.

8. DESTRUCTIVE INSECTS:

Special references: Insect 928; Larva 1032; Pupa 1564; Caterpillar 349; Moth 1270; Butterfly 296; Fly 687; Gnat 775; Hessian Fly 870; Galls 730; Tick 1910; Codlin-Moth 419; Hawk-moth 851; Ichneumon Fly 912; Beetles 194; Potato Bug 1537; Carpet Beetle or Buffalo Moth 340; Buffalo Gnat 286; Ladybug or Ladybird 1019; Weevils 2064; Cottonboll Weevil 465; Curculio 2064; Peach Tree Borer 1434; Chinch Bug 389; Grape Phylloxera 795; Worms: Cottonworm 465; Tobacco-worm 1918; Cutworm 491; Cankerworm 322; Onion Maggot 1383; Army Worm 109; Grasshopper 796; Locust 1106; Cicada or 17 year Locust 397; Plant Lice or Aphides 82; San Jose Scale and other scale insects 1686.

Consult:

- Farmers' Bulletin No. 155 How Insects Affect Health in Rural Districts.*
Farmers' Bulletin No. 264 The Brown-tail Moth and How to Control It.
Farmers' Bulletin No. 275 The Gipsy Moth and How to Control It.
Farmers' Bulletin No. 99 Insect Enemies of Shade Trees.
Farmers' Bulletin No. 120 Insects Affecting Tobacco.
Farmers' Bulletin No. 196 Usefulness of the American Toad.

9. THE FUNGI:

- a. Fungous Plants which take food from other plants or animals: 724; Haustoria 847.
- b. Symbiosis: the living together of two kinds of organisms 1859.
- c. Parasites: which obtain food from living hosts 1420.
- d. Saprophytes: which live in decaying organic matter 1678.
- e. Mycelia: the colorless threads of the fungus 1293.
- f. Blight: 227; Microbes 1219; Bacteria 154; Mildew 1224.
- g. Root Fungus: 1294; Rust and Smuts 17; Rust 1649.
- h. Mushrooms: Toadstools and Puff Balls 178.

10. SPRAYING MIXTURES AND INSECTICIDES:

- a. Spraying Mixtures: 1804.
- b. Ammoniacal Solution of Copper Carbonate.
- c. Paris Green Formula.
- d. Lime Sulphide Wash Formula.
- e. Kerosene Emulsion.
- f. Carbon Bisulphide.
- g. Arsenate of Lead.
- h. Bordeaux Mixture 246.

Consult:

- Farmers' Bulletin No. 127 Imported Insecticides.*

Farmers' Bulletin No. 145 Carbon Bisulphide as an Insecticide.

Farmers' Bulletin No. 231 Spraying for Cucumber and Melon Diseases.

Farmers' Bulletin No. 243 Fungicides and Their Use in Preventing Diseases of Fruits.

Farmers' Bulletin No. 233 Spraying for Apple Diseases and the Codlin Moth in the Ozarks.

Farmers' Bulletin No. 221 Fungous Diseases of the Cranberry.

11. THE SILO:

a. Ensilage: 619.

b. Silos: 30.

c. Fermentation: 656.

Consult:

Farmers' Bulletin No. 32 Silos and Silage.

Farmers' Bulletin No. 292 Cost of Filling Silo.

12. FOODS AND FEEDING STUFFS:

a. Food: 689.

b. Feeding stuffs: 651.

c. Proteids: the tissue forming foods 1553.

d. Carbohydrates and fats: the heat-producing food 332.

e. How food is made by the plant leaves: 1479; 1487.

f. Starch: 1811.

g. Glucose or grape sugar: 775.

h. Albumen: 41.

i. Balanced ration: 159.

j. Nutrition: 1366.

Consult:

Farmers' Bulletin No. 142 Principles of Nutrition and Nutritive Value of Foods.

Farmers' Bulletin No. 298 Food Value of Corn and Corn Products.

Farmers' Bulletin No. 346 The Computation of Rations for Farm Animals.

Farmers' Bulletin No. 22 The Feeding of Farm Animals.

Farmers' Bulletin No. 331 Forage Crops for Hogs in Kansas and Oklahoma.

13. DAIRYING AND STOCK RAISING:

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Consult:

Farmers' Bulletin No. 55 The Dairy Herd.

Farmers' Bulletin No. 106 Breeds of Dairy Cattle.

Farmers' Bulletin No. 42 Facts About Milk.

Farmers' Bulletin No. 63 Care of Milk on the Farm.

Farmers' Bulletin No. 206 Milk Fever and Its Treatment.

Farmers' Bulletin No. 348 Bacteria in Milk.

Farmers' Bulletin No. 241 Butter Making on the Farm.

Farmers' Bulletin No. 166 Cheese Making on the Farm.

Farmers' Bulletin No. 170 Principles of Horse Feeding.

Farmers' Bulletin No. 351 The Tuberculin Test of Cattle for Tuberculosis.

Farmers' Bulletin No. 152 Scabies of Cattle.

Farmers' Bulletin No. 258 Texas or Tick Fever and Its Prevention.

Farmers' Bulletin No. 350 The Dehorning of Cattle.

Farmers' Bulletin No. 183 Meat on the Farm: Butchering, Curing and Keeping.

Farmers' Bulletin No. 205 Pig Management.

Farmers' Bulletin No. 100 Hog Raising in the South.

Farmers' Bulletin No. 379 Hog Cholera and Swine Plague.

Farmers' Bulletin No. 49 Sheep Feeding.

Farmers' Bulletin No. 96 Raising Sheep for Mutton.

Farmers' Bulletin No. 137 The Angora Goat.

CLASSIFIED QUESTIONS

AGRICULTURE

- What is agriculture? 26.
Has farming helped civilization? 26.
What ancient people knew the wisdom of crop rotation? 26.
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How much of the plant body comes from the soil? 1636.
Why do plants have roots of different lengths? 1636.
What helps to keep down weeds? 1636.
How does crop rotation help farm labor? 1636.
What crop rotation is recommended for the southern states? 1636.
How does breaking up the soil crust keep moisture in the ground? 331.
For what are nitrogen-gathering crops, like the pea and bean, remarkable? 1353.
How many pounds of nitrogen can an acre of cowpeas produce? 1353.
What is the market value of nitrogen? 1354.
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Where are horses raised extensively? 1828.
Why must our future meat supply come from the farm? 1828.
In what stockyards are 25,000 men employed? 1830.
For what two purposes are cattle being developed? 352.
How many hogs are marketed in a year? 1857.
When did government inspection of meat begin? 1196.
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Why are the average farm yields so low in the U. S.? 28.
What was the situation of the American farmer 100 years ago? 28.
When was the first society for promoting agriculture organized? 28.
Where are experiment stations usually located? 28.
What is the Land Grant Act? 29.
What have the Adams and Hatch Acts done for agriculture? 29.
When will each experiment station have \$30,000 a year? 29.
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Who fashioned the modern plow? 29.
How are the plow, hoe, pick and hatchet related? 1506.
What does wheat cost to reap by a harvester? 1592.
What Chicago mayor bought a half interest in McCormick's reaper in 1846? 1133.
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 How do our farmers support our manufactories? 29.
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 What does the separator do? 30.
 How can a farmer tell his most profitable cows? 30.
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 How much cream does the law require milk to have? 151.
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 What university gives instruction in agriculture by correspondence? 32.
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 What are the Wolf-Lehmann feeding standards? 159.
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How are creameries conducted? 475.
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1778.
What is "mound" layering? 1040.
What is green crop manure? 1165.
What plants are most widely used for this purpose? 1165.
What makes manure worth \$2.50 to \$4.50 per ton? 1165.
What causes horse manure to lose \$1 per ton during summer? 1165.
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What is a hybrid plant? 1501.
Do most seeds "breed true"? 1501.
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1501.
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How do air currents carry seeds? 1718.
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What part of the seed is involved in the bean pod? 721.
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What large proportion of crops are destroyed by insects? 929.
What is the name of the young of all insects? 1032.
What is the most important insect enemy of the fruit grower? 419.
What three states suffer \$7,000,000 damage yearly from the codlin-moth?
419.
What is a preventive for this insect? 419.
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What insect is mistakenly called American blight? 82.

- What are the natural enemies of plant lice? 82.
 What insects keep herds of plant lice as "milk cows"? 82, 76.
 What valuable service does the ladybug give to farmers? 1019.
 How did the Australian ladybird save the orchards of the Pacific Coast? 1019.
 What destructive insect has spread from San Jose, California, to every state in the Union? 1687.
 How was it carried from place to place? 1687.
 How are maple trees damaged? 1687.
 How are the twigs marked when this pest is present? 1687.
 What insect is destructive to vineyards? 795.
 What moths work havoc on the grapevine? 1270.
 What causes young grape leaves to curl up? 1270.
 What moth strips the foliage from fruit and shade trees? 1271.
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 What are the natural enemies of the army worm? 109.
 How does the ichneumon destroy caterpillars? 912.
 How does the cotton boll-weevil destroy the cotton fibre and seed? 465.
 How is the Department of Agriculture trying to fight the boll-weevil? 465.
 When did the boll-weevil come from Mexico? 465.
 How does the plum weevil bury her eggs in the fruit? 2064.
 What insect destroys the strawberry patch? 2064.
 How are beetles useful; and how are they destructive? 194.
 What are the natural enemies of the beetle? 194.
 How long does it take an army of canker worms to devastate a large grove of trees? 323.
 How should trees be protected from canker worms? 323.
 What bird was brought from England to fight the canker worm pest? 322.
 What do the cut worms feed on? 491.
 How may plants be protected from cut worms? 491.
 In what part of the United States has the chinch bug caused a loss of \$60,000,000 in a single year? 389.
 How is the chinch bug marked and colored? 389.
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 How were they successfully combated in 1877? 796.
 Is a grasshopper different from a locust? 496.
 How are locusts destroyed? 1106.
 Is the katydid harmful to vegetation? 993.
 How many eggs are found in a peach tree borer? 1434.
 During what months should trees be gone over for the peach tree borer? 1434.
 On what part of the tree are the eggs laid? 1434.
 What is the appearance of the tobacco and tomato worms? 1918.
 When should a tobacco worm by no means be destroyed? 1919.
 What are hawk-moths? 851.
 How are jimson weed and molasses used for combating this pest? 1919.
 What did the potato bug feed on up to 1859? 1537.
 How many years did it take the potato bug to spread over the entire United States? 1537.
 How does the gall fly deposit its eggs on plants? 688.
 How does the stable fly differ from the house fly? 688.
 What crop has suffered immense damage from the Hessian fly? 870.
 Whereabouts on the grain stalk does the young Hessian fly fasten itself? 870.
 How can this pest be destroyed? 870.
 What destructive house pest is often found on currant bushes? 340.
 What insect feeds on flies and butterflies and robs the honey bee on her way home? 886.
 What are young wasps fed on? 2050.
 How do insects use the gall nuts or oak apples found on the leaves and stems of oak trees? 1368.
 What greedy insects will eat through book covers? 418.
 How are insects useful to the flowers? 930.

- How are the earthworms of service to the soil? 575.
 How many tons of soil in an acre of garden will pass through the bodies of earthworms in a year? 575.
 What are the most dangerous worms? 2012.
 Where are the trichina worms found lodged in pork? 1942.
 What do the trichina worms do after they get into the human body? 1942.
 How do hogs get trichina into their bodies? 1942.
 What insect kills poultry and domestic animals? 286.
 What is the difference between the red rust on wheat stalks and the black rust on wheat stubble? 17.
 What are the rusts and smuts that destroy cereals and higher plants? 17.
 Is there any successful way to combat the rusts? 1649.
 Why do fungus plants attack other plants? 724.
 What are parasites? 1420.
 What very small plant causes souring in milk and fruit juices, fermentation and decay, pear-blight and melon-wilt? 155.
 What diseases may be caused by milk? 1824.
 What is the chief value of cooking food? 1824.
 Why is it necessary to sterilize all articles used about milk? 1225.
 What treatment is recommended for plants suffering from downy and powdery mildews? 1224.
 What treatment is good for the foliage and fruit of pear trees suffering from pests? 1435.
 What is blight? 227.
 How may blights be roughly classed? 227.
 What causes \$30,000,000 damage yearly to cereals in the U. S.? 227.
 What are some of the typical plant diseases? 227.
 What is the treatment for potato-scab and smuts? 227.
 What splendid results were shown by the Department of Agriculture in treating leaf-blight? 227.
 What is the formula for the Bordeaux mixture? 247.
 What are spraying mixtures? 1804.
 How is the ammoniacal solution of copper carbonate made? 1804.
 How many sorts of insecticides are used for spraying? 1804.
 How are sucking and biting insects killed? 1804.
 What is paris green made of? 1804.
 How is kerosene emulsion made? 1804.
 How is carbon bisulphide used for cut-worms? 1804.
 How are the seeds of the poison ivy scattered? 1511.
 How did the poison oak get its name? 1511.
 How may poison sumac be known from other shrubbery? 1511.
 What plant eaten for greens has very poisonous roots? 1511.
 How is flour sometimes made poisonous? 1511.
 What deadly poison is contained in the seeds and leaves of the black cherry? 1511; acid 7.
 How may children be poisoned by jimson weed? 1512.
 What hawk destroys innumerable grasshoppers and mice? 850.
 Why should the duck-hawk and the pigeon hawk be destroyed? 850.
 What hawk is the dreaded enemy of poultry? 850.
 Why should the chicken hawk never be injured? 850.
 What hawk is the greatest of all destroyers of noxious four-footed animals? 850.
 Should the shooting of hawks be encouraged? 850.
 Why should the owls be protected? 1403.
 Which owl is the greatest enemy of rats? 1403.
 What fierce owl has given a bad name to all the family? 1404.
 What is the food of the screech owl? 1404.
 What owls are savage little creatures, often killing each other in fighting? 1404.
 What bird destroys large numbers of the codlin-moth? 419.
 Why should woodpeckers be protected in every possible way? 2107.
 What bird may well be called caterpillar bird? 485.
 How are caterpillars protected from the birds? 350.
 What bird eats the seeds of weeds? 1195.

ANATOMY AND PHYSIOLOGY

- What bird is a desirable neighbor and should have a house built for it? 231.
What bird does great damage to rice fields? 233.
What good work is done by the bob-white? 233.
What bird rids the air of gnats and mosquitoes? 288.
What bird is called the mosquito hawk? 1349.
What birds are noted thieves and often steal jewelry? 1147.
What bird is accused of killing bees? 1004.
What injury is done to shade trees and orchards by the sap-suckers? 1678.
How has it been proved that they eat very few bees? 1004.
What bird has a special liking for the long haired caterpillars and potato bugs? 1929.
How do the crows make up for their damage to a farmer's cornfield? 482.
How do the crows like corn that has been dipped in tar? 482.
What sort of a scare-crow makes these wily birds very suspicious? 482.
How are toads of great benefit to man? 1918.
What kind of bats settle on the backs of horses and cattle and suck blood? 180.
Why is the bat a splendid "night policeman"? 180.

IRRIGATION AND FORESTRY.

- Did any ancient people use irrigation? 940.
What did the Mormons do in irrigation? 940.
What are the provisions of the Reclamation Act? 940.
When was the first completed works opened? 941.
Where will be the largest artificial lake in the world? 941.
What is the essential part of an irrigation scheme? 941.
What has irrigation done for Riverside, Cal.? 1617, 309.
How may 500 bushels of potatoes be raised per acre? 942.
How many inches of rainfall are needed for dry farming? 942.
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What connection has irrigation with drainage? 942, 549.
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What irrigation plan is now being worked out by the Canadian Pacific R. R.? 320.
How has the National Irrigation Act helped agriculture? 29.
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What is a water table? 549.
What are the benefits of under-drainage? 549.
How many miles of canals in England? 321.
What is the most notable drainage canal? 321.
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What was the first railroad built in the U. S.? 1581.
What is the largest railway in America? 1582.
What has the automobile done for good roads? 147, 1618.
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How many national forests are there? 693.
How much timber may any settler cut in a national forest? 693.
Where are the national forests located? 693.
How does forest soil help the water supply? 694.
What is the Forest Service Office? 693.
How can a position be obtained in the Forest Service? 693.
How have forest fires been reduced? 694.

ANATOMY AND PHYSIOLOGY

- What common mistake is made concerning the range of anatomical study? 67.
What is its true scope? 67.
Why did anatomical study begin with the most complex animals instead of with the simplest? 67.
What difficulties beset the pioneer anatomists? 67.
How did Aristotle gain much of his knowledge of anatomy? 67.

When was the dissection of the human body first legalized? 67.
 Who was the accepted authority on anatomy for fourteen centuries?
 67.
 Whose book laid the foundations of modern anatomy? 67.
 What school attracted students from all over Europe? 67.
 In what century was the study of human anatomy well established? 67.
 What made the subject one of great interest? 68.
 Who started the study of microscopic anatomy? 68.
 Who founded the science of comparative anatomy? 68.
 Who founded the department of histology? 68.
 What does embryology deal with? 68.
 Who is the founder of the modern ideas of development? 68.
 What are these ideas? 68.
 What is the distinction between morphology and physiology? 68.
 What questions does physiology attempt to answer? 1486.
 Who made physiology an independent study? 1486.
 Whose work marks the beginning of modern physiology? 1486.
 What subjects are dealt with under "nutrition"? 1486.
 What does "relation" imply? 1486.
 What does "reproduction" consider? 1486.
 What is hygiene? 905.
 What two men have contributed most largely to this science? 905.

SKELETON.

In a broad sense, what does the term skeleton include? 1763.
 What are some examples of exo-skeletons and endo-skeletons? 1763.
 What are some of the conclusions reached by comparative study of
 endo-skeletons? 1763.
 What two uses are served by these hard parts? 1763.
 How many separate bones are there in the human skeleton? 1763.
 How many bones has the skull in early adult life? 1763.
 Is this number the same for youth and for old age? 1763-4.
 How many bones are there originally in the spinal column? 1763-4.
 What changes take place? 1764.
 How many ribs are there? 1764.
 How many bones are there in the arm? 1764.
 In the leg? 1764.
 What holds the bones together? 1764.

SKULL.

What is the skull? 1764.
 What similarity is there between the skulls of fishes and mammals?
 1764.
 What was the vertebral theory of the skull? 1764.
 What great poet held this theory? 1764.
 How did Huxley show this theory to be false? 1764.
 What is the outer covering of the skull called? 1687.
 Does the skin of the scalp differ from that of the rest of the body?
 1687.

BONE.

What is the hard material of the skeleton called? 242.
 What is the office of the bones? 242.
 Of what two substances is bone composed? 242.
 What different results are obtained by burning and by soaking in
 acids? 242.
 What are the three shapes of bones? 242.
 What are the tiny holes in the compact bony substance? 242.
 What is marrow? 242.

MUSCLE.

What is muscle? 1283.
 Of what is muscular tissue composed? 1283.
 What part does it serve? 1283.
 Are the simpler animals provided with muscles? 1283.
 Upon what do their movements depend? 1283.

Where in the plane of life do muscles first appear? 1283.
What are the three varieties of muscles? 1283.
How many muscles are there in the human body? 1283.
What governs the naming of the muscles? 1283.
When a muscle acts, does it expand or contract? 1283-4.

GRISTLE.

What is the common name for cartilage? 806.
What use is served by temporary gristles? 806.
What uses are served by permanent gristles? 806.

SKIN.

Of what does skin consist? 1764.
What is the composition of the dermis? 1764.
How are the scales of the epidermis removed and renewed? 1764.
What gives color to the skin? 1764.
What and where are the sweat glands? 1764.
What are some of the outgrowths from the epidermis? 1764.
What are the offices of the skin? 1764.
If the body should be covered with varnish or leaf metal, what would be the result? 1764.

NERVES.

What are the nerves? 1320.
What are the two kinds of nervous tissue? 1320.
How many cranial nerves are there? 1320.
How many spinal nerves are there? 1320.
What is the difference in the development of the motor and sensory nerves? 1320-21.
What is the course of the twelve pairs of cranial nerves? 1321.

HAND.

How do the fore limbs in the different vertebrates compare? 833.
Of what does the hand proper consist? 833.
How many bones are there in the human hand? 833.
How do philosophers regard the adaptability of the hand? 833.

FOOT.

What is the structure of the human foot? 690.
What is a plantigrade foot? 690.
What is a digitigrade foot? 690.
What animals stand upon a single toe? 690.
What are the odd-toed animals? 690.
What is the history of the horse's modified foot? 690.

TEETH.

Why are teeth important to naturalists in classifications? 1880.
Why are they important to students of fossil life? 1880.
What is the structure of the teeth of mammals? 1880.
What is the hardest substance in the human body? 1880.
How many teeth has man? 1880.
What are the four kinds of teeth? 1880.
What are the two sets of teeth? 1880.

CELL DOCTRINE.

What two men originated the cell doctrine? 68, 355.
What is this doctrine? 355.
Why may cells be regarded as the bricks of organic structure? 355.
Are cells uniform in size or shape, or do they vary? 356.
To what tissues was this theory first thought to be limited? 356.
What was it gradually seen to include? 356.
What wrong idea did Schleiden and Schwann have regarding the cells? 356.
What live substance fills the cells? 356.
Who established the protoplasm theory? 356, 1554.
In the light of this theory, how is the cell defined? 1554.
Is all protoplasm alike? 1554.
How are new cells derived? 356.

EYE.

- What is a skin eye? 643.
What are the three coats of the eyeball? 643.
What is the vitreous humor? 643-4.
The aqueous humor? 644.
What is the pupil? 644.
What makes it vary in size? 644.
What is the structure of the retina? 644.
What is the yellow spot of the eye? 644.
What is the optic nerve? 644.
What is the blind spot? 644.
Does the eye itself do the seeing? 644.
When is a person short-sighted? 644.
When is a person long-sighted? 644.
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EAR.

- What is the ear? 572.
In the simpler forms of life, how is the ear constructed? 572.
How does the ear start in all vertebral animals? 572.
What is the outer ear? 572.
What separates it from the middle ear? 572.
What are the three bones of the middle ear? 572.
What is the eustachian tube? 572.
How does the middle ear in birds and reptiles differ from that in the higher animals? 572.
What are the parts of the inner ear? 572.
What are the organs of Corti? 573.

NOSE.

- Can some animals smell, though they have no nose? 1362.
What sort of an organ is the nose? 1362.

TONGUE.

- What is the tongue? 1922.
What is the bridle of the tongue? 1922.
What parts of the tongue are most sensitive to taste? 1873.
What must be done to a substance before it can be tasted? 1873.
What substances are easily tasted even when greatly diluted? 1874.
What are the two sets of muscles governing the tongue? 1922.

BRAIN.

- Why is the brain the most interesting organ of the body? 257.
What is the central nervous system? 257.
What is the general nature of the changes from the brains of the simpler to those of the higher animals? 257-8.
Of what does the gray matter of the cortex consist? 258.
How is the cortex connected with other parts of the brain? 258.
What are the various kinds of fibers? 258.
What is the relation between certain groups of nerve cells and particular activities of the body? 258.
Why is any injury to the medulla oblongata very serious? 258

LUNGS.

- What are the two kinds of respiratory organs? 1603.
What is the essence of respiration? 1603.
Is it of the same nature in all animals and in plants? 1603.
In what plane of animal life do lungs first appear instead of gills? 1603.
What is the structure of the lungs in man? 1603.
What are the bronchial tubes? 1603.
What exchanges take place in the capillaries? 1603, 229.
What two kinds of respiration take place in the lungs? 1603.

HEART.

- What is the function of the heart? 853.
Is it present in both vertebrate and invertebrate animals? 853.

What animals have two-chambered hearts? 853.
 What animals have three-chambered hearts? 854.
 What animals have four-chambered hearts? 854.
 In the embryo of the higher animals, what changes take place in the heart? 854.
 What is the structure of the heart in man? 854.
 What is the difference between veins and arteries? 854
 What is the great aorta? 113.
 Who gave it its name? 113.
 What is the pulmonary artery? 113.
 What are the two circulations? 113.
 Who demonstrated the circulation of the blood? 67, 1486.
 What is the function of the blood? 228.
 What sort of an exchange does it carry on with the tissues? 228-9.
 Of what is blood composed? 229.
 What do the red corpuscles carry? 229.
 What powers do the white corpuscles have? 229
 What is lymph? 1126.
 What are its functions? 1126.

STOMACH

What is saliva? 1653.
 What is the stomach? 1831.
 Is this organ present in all animals? 1831.
 How many coats has the stomach? 1831.
 What juice is secreted by the stomach? 1831.
 What juice is secreted by the intestine? 1831.
 Which of these juices is most effective in digestion? 1831.
 What is chyme? 1831.

LIVER.

What is the liver? 1102.
 What is its structure? 1102.
 What are the offices of the liver? 1102.
 What is there peculiar about the circulation in the liver? 1102.

HYGIENE

What is the aim of hygiene? 905.
 What is hygiene called? 905.
 What is included in personal hygiene? 905.
 What does the health officer look after? 905.
 How did John Howard do away with jail-fever? 905.
 What did Captain Cook do for scurvy? 905.
 When was vaccination introduced into practice? 905.
 What is the present condition of hygiene in every large town? 905.
 Why are seaports watched? 905.
 How did John Howard get his ideas of prison reform? 892.
 What captain took such care of his crew that only one seaman died in three years? 449.
 Who was first vaccinated with perfect success? 969.
 What has cowpox to do with smallpox? 969.
 What is the temperature of living rooms in the U. S. and Europe? 856.
 What three systems of heating are in use and how do they compare in cost? 856.
 Why is a mixed diet best? 690.
 Why was the Chicago drainage canal built? 1730.

ASTRONOMY

Which is probably the oldest of the sciences? 127.
 At what early date was it already well systematized? 127.
 To what two men was this advancement due? 127.
 At this time, what did the Greeks know concerning the fixed stars and the planets? 127.
 Concerning latitude and longitude? 127.
 Concerning eclipses and the equinoxes? 127.

- What Alexandrian scholar wrote a complete treatise on astronomy? 1558.
- Whose catalogue gave the positions of 1,088 stars? 128.
- With what astronomer does the modern science begin? 128.
- How did he regard the sun in connection with the solar system? 128, 451.
- How had the Greeks considered this? 128, 451.
- What two phenomena of gravity and light made it almost certain that the earth is in rotation? 128.
- Who discovered these phenomena? 128.
- What discovery of Newton's practically completed the proof of the Copernican theory? 128
- In the seventeenth century, what invention gave a great impulse to astronomical study? 128.
- What has caused the advancement in our knowledge of the solar and stellar systems? 128.
- What science has proved of the greatest aid in astronomical investigation? 1476.
- What are the four main branches of astronomy? 128.
- What does general astronomy include? 128.
- What does mathematical astronomy deal with? 128.
- What work comes under the head of practical astronomy? 128.
- What is meant by astrophysics? 128.
- What are the fundamental instruments required? 128.
- What is the difference between an observatory and a laboratory? 1369.
- What telescopes are the finest in the world? 1885.
- Where is the famous Yerkes observatory? 1369.
- Who invented the telescope? 1885.
- What sort of a glass was Galileo's telescope? 1885.
- What is the twofold purpose of the telescope? 1885.
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What abolitionist received the name of Ossawatimie? 275
What is international law? 933.
Who were the buccaneers? 281.
What was the Iron Age? 939.
What was the charge of the Light Brigade? 150.
Who wrote the famous line: "Westward the course of empire takes its way"? 203.
What queen married a brewer because she was so much pleased with his dancing? 1949.
When do equinoxes occur? 622.
What people flatten their children's heads? 394.
What city of eighty thousand people has no hotels? 1576
Where did Punch and Judy originate? 1561.
What is Pompey's pillar? 1525.
What was the Gordian knot? 781.
Who was known as the Red Prince? 712.
What island is called Sailor's Grave, and why? 1651.
What was the Salic law? 1665.
What people use birds' nests for soup? 247.
When and where was the first clearing house established? 169.
What is the highest volcano in the world? 464.
What people allow snakes to come into their home and believe they are ancestors? 1725.
What was the Stone of Destiny? 1707.
When did riddles first come into use? 1613.
What was the largest merchant vessel ever built? 1743.
What place is called the White Man's Grave? 1754.
When did the first system of shorthand come into use? 1747.
When and by whom was the guillotine introduced? 812.
What is a night dial? 526.
What public woman opposed Lincoln's election? 530.
What kingdom had an army of 10,000 soldiers mostly women? 496.
What city is built over a vein of silver? 2128.
Where were lotteries first known? 1116.
What was the origin of lynch-law? 1126.
How small were horses at one time? 639.

DISCOVERIES AND INVENTIONS

What two brothers have conquered the air? 20.
Who is famous as the inventor of wireless telegraphy? 1169.
Whose experiments laid the foundation for wireless telegraphy? 1882.
What telegraph system will send 150,000 words an hour? 1885.
How may drawings and sketches be sent by electricity? 1881.
When and by whom were roller skates invented? 1763.
What did Elias Howe realize from his sewing machine? 1730.
What is the process of electrotpe? 604.
What are the Elgin marbles? 605.
What famous inventor is called the "Wizard of Menlo Park," and how did he get his start? 582.
From what fluid was India ink formerly made? 491.
How are the different colors produced in fireworks? 676-7.
What is the difference between an ordinary and an instantaneous fuze? 726.
What is a petard? 1459.
Who first introduced steel as a material for constructing guns? 1013
When was the first law of patents passed? 1428.
Who is credited with first unwinding a silk cocoon? 1757.
How long does a patent right last? 1428.

- Who perfected the Remington typewriter? 1963.
 Whose invention was the foundation of the wealth of the cotton-growing states? 2080.
 For what is a telemeter used? 1833.
 Who is the inventor of the gas motor? 740.
 Whose invention was the starting point for our modern rifle? 1614.
 When was gun cotton invented? 815.
 What nation is thought to have invented gunpowder? 815.
 What three important discoveries were made by means of the Coast Survey? 415.
 When was the first microscope made? 1220.
 When was nitroglycerine discovered? 1354.
 What is the Nobel prize? 1354.
 What doctor gave us the word "electric"? 596.
 Who invented the linotype and monotype machines? 1962.
 Who is undoubtedly the inventor of the telephone? 1884.
 When were steel sewing needles first made? 1317.
 Where are spectacles said to have been invented? 1793.
 What electrical discoveries were made by Stephen Gray? 596.
 What important improvements were made by Mr. Sprague in 1887 in electric railroads? 601-2.
 What discovery of Witt's must rank as one of the important astronomical discoveries of recent years? 126.
 What machine is based on the discoveries of Prof. Ferraris of Italy? 601.
 What discovery did Copernicus make? 128.
 Where was the first electric railway? 601.
 Who invented the needle gun, and when? 553.
 When was dynamite invented? 568.
 What important discovery did Faraday make with electricity in 1831? 568.
 Who invented the grand piano? 623.
 Whose invention changed the navies and navigation of the world? 1913.
 What art was invented by Senefelder? 1100.
 Who built the first lifeboat? 1067.
 Who designed the lifeboat, and when? 1067.
 How old is the process of tanning skins, and where invented? 1043.
 What is the earliest and simplest form of engraving, and by what country was it introduced? 2106.
 How are depths of great bodies of water found? 1783.
 When was the first typewriter invented? 1963.
 Who invented printing with movable type? 817.
 Who invented the process of puddling and rolling? 939.
 What is the Bessemer process of making steel? 1820.
 Who invented the power loom? 343.
 When did balloons come into use? 19.
 Who discovered the true cause of the tides, and how? 1911.
 In what city have nails been manufactured for 300 years? 1298.
 What is the origin of the telephone? 1884.
 Who designed and built the first locomotive in America? 450.
 Where were the first galley boats made? 455.
 When was the first fountain pen used? 1443.
 What led Edison to the discovery of the phonograph? 1474.
 How was paper first made? 1417.
 How is papier maché made? 1418.
 When and where was the first life-boat built? 1066-7.
 How is parchment prepared? 1420.
 What is the process of stereotyping? 1823.
 Who invented the first steam hammer? 1817.
 Who made the "Rocket" steam engine famous, and who was its builder? 1817.
 Who invented the stereoscope? 1823.
 When and by whom was stereotyping invented? 1823.
 When and where was the first telegraph line laid successfully? 1267.
 Who was the inventor of glass? 773.
 What led to the invention of the spinning jenny? 838.

When and by whom was the first blast furnace worked? 939.
 When and by whom was the flint lock gun invented? 814.
 Who invented macadamizing, and where first introduced? 1129.
 Who invented the spinning mule? 481.
 How long has irrigation been practiced? 940.
 What was the first cotton mill built in the United States? 465.
 Who was the founder of the science of hydrography? 1191.
 What important invention did Sir Humphrey Davy make, and what led to the discovery? 1652.
 What led to the discovery of the photophone? 1478.
 How and by whom was the Silurian system discovered? 1280.
 When and by whom was gas invented for use as lighting purposes? 1280.
 What is the process of vulcanizing rubber, and who discovered it? 920.
 How early was steam used for moving boats? 1818.
 What was the first steam vessel to make a voyage? 1818.
 What discovery led to the invention of the barometer? 174.
 Why are some bricks red and some buff colored? 265.
 How is charcoal made? 367.
 What led to embalming among the Egyptians? 591.
 What is the process of photography? 1476.
 In how many seconds will an air brake stop a train going 50 miles an hour? 259.
 How are new inventions protected? 1428.

EDUCATION

What college graduated lady physicians in the 12th century? 1987.
 May women study at Harvard? 1988.
 What college did George Washington endow? 2024.
 Where was the degree of bachelor first introduced? 1987.
 Who invented our punctuation marks? 1561.
 Who discovered the profession of teaching? 945.
 What college was founded by Henry VI in 1440? 630.
 What was the procession of the boys to Salt Hill for? 630.
 Who were the best educated people in Europe in the 18th century? 1708.
 Who were the bookmakers and translators of the middle ages? 1063.
 What is the oldest university in Germany? 760.
 In what strange way have some early manuscripts been discovered? 1412.
 Why did Pestalozzi write "How Gertrude Educates Her Children"? 1459.
 Who was the founder of comparative geography? 1617.
 What was the cause of the Associated Press, and when organized? 123.
 What is the largest Catholic institution in the west? 1783, 1990.
 What university was founded under the auspices of King George II of England? 1987.
 Where is the oldest Scandinavian university? 1987.
 What country ranks first in universities? 760.
 How many years did Noah Webster spend in preparing the American Dictionary? 2063.
 What woman founded a seminary upon the plan of uniting domestic labor with intellectual culture? 1127.
 Where and what is the largest library in the world? 1064.
 When was the first circulating library started in London? 1063.
 What is the school system of Württemberg? 2133.
 What university chooses its chancellor for life without a salary? 1405.
 Where was the first Sunday School held in America? 1849.
 What is the artillery school instituted for? 115.
 Where is the oldest university of central Europe? 1987.
 What are the characteristics of the universities of England that differ from others on the continent? 1987.
 When was the oldest university founded in Germany? 760.

EDUCATION

- How are the universities of Germany controlled, differing from others? 760.
- Where was the first book published in the United States? 313.
- What is the Pool of Knowledge? 199.
- What is the polite language? 1028.
- Who is the greatest of all letter writers? 1058.
- When was Webster's Dictionary first published? 2063.
- What history is held to be the authority on Chinese life and manners? 2089.
- What university in the United States resembles the German universities in its methods? 1988.
- What is the oldest university in the United States? 1988.
- What was the second college founded in the United States? 2024.
- What is the oldest university of Scotland? 1987.
- What was the earliest and most famous of the colleges in the middle ages of Paris? 1987.
- When and where was the first teachers' institute held? 1877.
- What great reformer spent most of his life in perfecting the kindergarten system? 719.
- Who formed the Chautauqua assembly? 374.
- What country requires every child to have three years' schooling? 1857.
- What important educational institute is located in Baltimore? 164.
- What state has the largest school fund? 1241.
- What university had from 6,000 to 8,000 students in the thirteenth to the end of the seventeenth century and now has only 1,200 students? 1664.
- Who established the Working Men's Institute in Brighton? 1620.
- What was the first real science or system of political economy? 1517.
- When and where was the first polytechnic school established? 1522.
- Who was the founder of analytical geometry? 522.
- Who was the father of geometry? 631.
- Who founded Christ Church College at Oxford, England? 2104.
- What empress used her wedding gifts for endowing a college for women? 631.
- In what famous college did American missions to the heathen start, and by whom started? 2089.

TEACHING.

- How does apperception differ from ordinary perception? 83.
- How do Leibnitz and Kant use the term apperception? 83.
- What does Herbart teach about experience? 84.
- What gives the teacher his clue as to what the child can learn? 84.
- How is apperception important to the course of study? 84.
- What discovery has given a new development to the idea of apperception? 84.
- What is association of ideas? 123.
- What does Locke assume regarding this association? 123.
- What does Hartley say all mental processes depend upon? 124.
- What is the only real explanatory law of association? 124.
- How is association of ideas connected with apperception? 124.
- How may big trees and elephants be associated? 125.
- What do modern psychologists hold of all mental elements? 125.
- What is the meaning of the word psychology? 1556.
- Can mind or matter be defined? 1557.
- Who maintain that mind is the only reality in the universe? 1557.
- Who holds that mental acts are qualities of matter? 1557.
- What are the three divisions of the mental faculties? 1557.
- What lies back of education? 1557.
- What is the end of education thought to be? 1557.
- What is the most important example of the analytic method of teaching? 1558.
- What does the training of the mental powers consist of? 1558.
- What is the main business of education? 1201.
- What are the two methods of memorizing? 1201.
- What is the backbone of effective memory? 1201.

Tying a string around one's finger is called what? 1201.
 What is interest based on? 931.
 Why has interest been looked upon with suspicion? 931.
 What did Rousseau declare? 931.
 Why was Rousseau's educational scheme one-sided? 931.
 Why do we become interested in things? 931.
 What is soft pedagogy? 932.
 What does character mean? 932.
 What was Rousseau's idea of child education? 384.
 What does Herbart require of the teacher? 384.
 What was the most interesting conception of Froebel? 384.
 Who wrote "The Soul of the Child"? 385.
 What is a valuable clew to the interests of children? 384.
 How can a teacher get a pupil to learn? 385.
 What is the dynamic force of learning? 652.
 What is the secret of men's capacity to learn? 385.
 Why is the term feeling ambiguous? 652.
 What is the relation between feeling and cognition? 652.
 How do disagreeable feelings help us? 653.
 Can we have emotion without organic sensations? 653.
 How is emotion a valuable aid to education? 653.
 Why has the study of Latin been advocated? 1204.
 How did religious conceptions develop character? 1204.
 What is the faculty theory? 1204.
 How should all studies justify themselves? 1204.
 Will memorizing Shakespeare help to learn the rules of grammar?
 1204.
 What is the most important use of correlation? 1205.
 How is the term imagination ordinarily used? 916.
 How does imagination differ from memory? 916.
 What is the value of imagination? 916.
 Does imagination help the farmer, the mechanic, the milliner? 917.
 What will make the pupil critical but not productive? 917.
 How is habit distinguished from instinct? 821.
 What is habit indispensable to? 821.
 How may old habits be broken? 821.
 At what age are our habits formed? 821.

MODERN EDUCATION.

What are the five great epochs in educational history? 584.
 What is necessary for a liberal professional preparation for teaching?
 584.
 What is an extremely valuable work in education? 584.
 What has been done to disciplinary subjects? 584.
 What system of education was created in the 19th century? 585.
 Is education in the U. S controlled by the states or by the Federal
 government? 585.
 How many acres of land have been granted for state schools? 585.
 What is the most important relation of the school garden? 1691.
 Why are normal schools taking up school gardens? 1691.
 What great universities have taken up school agriculture? 1691.
 What does school organization and management embrace? 1691.
 What is school sanitation? 1691.
 How many cubic feet of pure air does each pupil need? 1692.
 What are school ships? 1692.
 What are the three periods of school song work? 1693.
 Why should a careful selection of school songs be made? 1692.
 What does the song, "Bring the Comb," picture? 1693.
 What are the teaching points gained by school songs? 1693.
 What are the difficulties of music in high schools? 1695.
 What is the function of public school music? 1695.
 What are the three essential means for comprehending music? 1286.
 How does the second phase of music study differ from the first? 1287.
 How should the motif be used? 1288.
 How has modern invention helped the study of music? 1288.
 What does musical notation deal with? 1288.

EDUCATION

- What is a key? 1289.
What is the key signature? 1290.
What is the meaning of largo, andante, allegro, presto? 1290.
How was literary education confined in the middle ages? 1695.
When was compulsory attendance established in Germany? 1695.
What idea did the Reformation bring? 1695.
Who were the Brethren of the Christian Schools? 1695.
In the beginning what was the end of popular education? 1695.
In what country must any school have official sanction? 1696.
In what condition were free schools in 1835, in Massachusetts? 1696.
In what way is elementary education superior in Europe? 1696.
How is American education better than that of Europe? 1696.
What are district schools? 1697.
Where are Indian schools? 1697.
What widespread movement is decreasing rural schools? 1697.
How does attendance differ in city and rural schools? 1697.
What are graded schools? 1697.
In what schools is each pupil a class by himself? 1697.
How are rural schools managed? 1697.
What is one of the firmly fixed beliefs of the American people? 1698.
What is the state school tax? 1698.
How were permanent school funds formed? 1698.
What is the most important problem of rural schools? 1698.
Why are few trained teachers found in rural schools? 1699.
What is said of "the little red schoolhouse"? 1699.
How many million children attend country schools? 1699.
Where was the first experiment of centralizing schools? 1700.
What is the plan of consolidation and transportation? 1700.
Does rural education cost more under the new plan? 1700.
What are the benefits of school board conventions? 1700.
What important plan of reform is considered by Congress? 1701.
When will life on the farm be better than any other life? 1701.
What is the aim of secondary schools? 1701.
What are the secondary schools of Germany? 1701.
What took the place of the Jesuit schools in France? 1701.
Where are these schools devoted entirely to the classics? 1701.
Where was the first high school established in the U. S.? 1702.
What difficult situation is the high school in? 1702.
How many high school students complete the course? 1163.
What is the most popular type of summer schools? 1702.
What is unique in the University of Chicago summer school? 1703.
What are the different schools for defectives? 1703.
What is the "sign language"? 1703.
Where were the first American schools for the blind? 1703.
How is commercial education conducted in the U. S.? 1703.
What two cities have high schools of commerce? 1704.
Where are colleges of commerce established? 1704.
Where were correspondence courses first organized? 461.
Is correspondence instruction satisfactory? 461.
What should correspondence students guard against? 461.
What are continuation schools called? 448.
Which state leads in continuation schools? 448.
How many continuation schools conducted by the Y. M. C. A.? 449.
What is one secret of the industrial advance of Germany? 449.
What is correlation of studies? 460.
How would Ziller use the story of Robinson Crusoe? 461.
Where was the first public normal school established? 1355.
What is the most valuable normal school work? 1356.
What four studies should amount to one-fourth of the entire normal course? 1356.
What is sloyd? 1768.
What is the fundamental tool in sloyd? 1768.
In what country did sloyd originate? 1768.
In what city did manual training schools begin? 1162.
Where was the first manual training exhibit in the U. S.? 1162.
What does manual training include in public schools? 1163.

What is the value of manual training on the artistic side? 1163.
 What materials are needed for manual training in the first grade? 1163.
 What are industrial schools a substitute for? 924.
 What did industrial drawing in public schools lead to? 924.
 When was the first public system of industrial schools established in the United States? 925.
 What are polytechnic schools? 1522.
 What is the name of the oldest polytechnic school in the U. S.? 1523.
 Are polytechnic schools efficient? 1523.
 How has the business college been of immense value? 295.
 How have business colleges developed in the last 50 years? 295.
 When was the first military school planned? 1224.
 How do cadets gain admission to West Point Academy? 1224.
 What is the yearly pay of each cadet? 1224.
 Where are four special military schools located? 1225.
 In what schools is the military drill a feature? 1225.
 How has the course of study in American colleges improved? 422.
 When were elective students introduced into Harvard? 422.
 What are a student's expenses in college? 422.
 Why was Princeton founded? 422.
 What attention do athletics receive in colleges? 423.
 What college had the first college paper? 423.
 What is the largest college in the United States? 423.
 How many women are going to college in the U. S.? 423.
 What is the college entrance examination board? 423.
 Where are the examinations held? 423.
 How many pupils who fail to gain entrance to college? 423.
 Does it profit anyone to go to college? 423.
 What great change has taken place in the past 25 years? 423.
 What class of persons does one meet in college? 424.
 What advantage has the college graduate? 424.
 What colleges are now preferred by many enlightened persons? 424.
 Why is the average instruction in any college not very good? 424.
 How should a college be chosen? 424.
 Who established kindergarten schools? 1002.
 What is the starting point of the kindergarten method? 1002.
 What is essential to success in kindergarten work? 1002.
 In what U. S. city was the kindergarten first tried? 1003.
 What is the main purpose of school excursions? 640.
 Upon what should all studies be based? 641.
 In what country does the teacher take a group of boys for a trip? 641.
 What are the chief classes of school excursions? 641.
 What does self activity mean? 1720.
 What are the two principal factors in education? 1720.
 Why is self activity encouraged? 1720.
 How should self activity be treated by the teachers? 1720.
 What are the two periods of adolescence? 14.
 What change takes place in thought and feeling? 15.
 When are personal habits fixed? 15.
 What is the practical problem of the educator? 15.
 What are Prof. James' valuable words of encouragement to youths? 15.
 What does domestic art include? 542.
 How does domestic science differ from manual training? 542.
 How long does a normal course in domestic science last? 542.
 What branches are taught in domestic science? 542.
 What is the purpose of parents' meetings? 1421.
 What did the National Congress of Mothers do? 1421.
 How may the parent be wiser than the teacher? 1421.
 What is the explanation of heredity? 867.
 What is the special characteristic of hypnotized persons? 906.
 What is the cataleptic state? 907.
 What theory of Mesmer has been exploded? 907.
 In what diseases is hypnotism useful? 907.
 Can hypnotism compel one to commit a crime against one's will? 907.

PEDAGOGICS.

- Who was Pestalozzi? 1458.
- What does the term pedagogics embrace? 1437.
- What forces are always at work in education? 1437.
- How does the world spirit influence youths? 1437.
- What value has the community spirit? 1437.
- What is the true end of formal education? 1437.
- What is the specific function of the teacher? 1437.
- What faculty sets up ideals and realizes them? 1437.
- What does the preparation of the teacher include? 1438.
- What is the act of learning? 1438.
- What is the highest form of knowledge getting? 1438.
- How may the teacher assist the child to learn? 1438.
- What is the law of the reaction of perception upon self activity? 1439.
- What does the philosophy of education include? 1439.
- What is methodology? 1440.
- What problems come under school organization and management? 1440.
- What are the five great epochs in educational history? 1440.

METHOD OF TEACHING.

- What are the three methods of learning? 1877.
- What method do the lower animals use? 1877.
- What method is used by most intelligent beings? 1878
- What is the purpose in teaching our fellows? 1878.
- What is the true motive of learning? 1878.
- Why do pupils try to outwit the school program? 1878.
- What have reformers of method endeavored to do? 1878.
- Upon what does the inductive method rest? 1878.
- Describe a lesson unit? 1878.
- What is the method of recitation? 1878.
- What causes pupils to drop out of school? 1839.
- How may education weaken the native self of pupils? 1839.
- Why should the children lead in recitation? 1839.
- What two factors in study do children recognize? 1840.
- Why is there so much dull drill work in school? 1840.
- Why should pupils recite by topics? 1840.
- Should pupils memorize *everything*? 1840.
- What should a teacher always bear in mind? 1841.

TEACHING OF LANGUAGE.

- What two problems in language instruction? 1026.
- How does good language teaching associate language forms? 1026.
- What are the differences between oral and written instruction? 1027.
- What is the aim in grammar? 1027.
- How is language treated? 1027.
- Why do many persons use incorrect forms of speech? 1027.
- Why are foreign languages taught in the seventh grade in some cases? 1027.
- What are the three aspects of reading? 1590.
- What is the thought method in reading? 1590.
- What do phonetic methods teach? 1590.
- Are diacritical marks used? 1590.
- What is appreciative reading? 1590.
- What study is spelling taught with? 1795.
- What are the four ways of getting the meaning of a word? 1795.
- How is the order of letters fixed in the memory? 1795.

ARITHMETIC.

- What change has taken place in teaching arithmetic in late years? 97.
- What topics are now omitted? 97.
- What change is affecting the problems of the younger pupils? 98.
- How does the increased interest of the children help them in their study of arithmetic? 98.
- What do many good teachers do in beginning arithmetic. 98.
- What devices help to make the steps clear? 98.
- Why should counting on the fingers be discouraged? 98.

What is the Austrian method of subtraction? 98.
 How does the long division form help in short division? 98.
 In what year should a text book be used? 98.
 Why should only two denominations be used in compound numbers? 99
 What is the approved form for multiplication of decimals? 99.
 How should operations in decimals be limited? 99.
 What is the Austrian method of division? 99.
 Where is the value in more advanced arithmetic? 99.
 How is percentage treated? 99.
 Should the term base be used? 99.
 How can the difficulty in studying arithmetic be overcome? 99.
 How do parents often confuse children in the study of arithmetic? 100.

ALGEBRA.

Who made algebra an independent science? 48.
 What is the use of algebra? 48.
 Will algebra assist me in my later work? 48.
 What kinds of problems may I solve more easily by algebra? 48.
 How may I work simple algebraic problems? 48.
 What does drawing mean? 551.
 How do artists use the term? 551.
 How did drawing get into school courses? 551.

GAMES.

What are the three classes of athletics? 131.
 What was the first baseball club in America? 177.
 What makes a good baseball player? 178.
 What society first played basket-ball? 179.
 What are the three kinds of football? 690.
 Where do 100,000 people attend a football game? 691.
 What is the Englishman's national game? 477.
 How many days are required to play a game of cricket? 478.
 What makes croquet interesting? 482.
 What is the origin of golf? 779.
 How is the game played? 779.
 How is the game of curling played? 487.
 When was lawn-tennis first played? 1890.
 How is the game played? 1890.
 What is the game of putting-the-shot? 1565.
 When were roller skates invented? 1763.
 What 14-year-old girl swam 5 miles in 67 minutes? 1856.
 How is the game of polo played? 1520.
 What is the best way to learn to play chess? 378.
 What game did the Spaniards introduce into Florida? 211.
 What people introduced bull-fights? 287.
 Where did the game of checkers come from? 368.
 How were games used by the ancient people? 735.
 To what does physical education refer? 1480.
 What three exercises partly supply the need of exercise? 1480.
 Why are formal gymnastics unsatisfactory? 1481.
 What is the first test of these activities? 1481.
 What games are more appropriate in the upper grades? 1481.
 Where was the first teachers' institute held? 1877.
 What is the most profitable method in institutes? 1877.
 Why is play as important as sleep? 734.
 Why does a puppy play at fighting? 734.
 What instincts do games use and control? 734.
 What games are important in the development of the child? 734.
 What people made games the principal form of education? 735.
 What does a noted reformer suggest about games? 735.
 Why have playgrounds originated in large cities? 1504.
 What is a valuable adjunct to school playgrounds? 1504.
 What city has 17,876 acres of parks? 1504.

EVOLUTION

- In its broad sense, what does evolution mean? 637.
 What is it usually limited to mean? 637.
 What is a common mistake made concerning Darwinism and evolution? 637.
 How great has been the influence of evolution in modifying thought in other fields? 638.
 Is it a question of creation or method of creation? 638.
 Where did the doctrine of special creation originate, and who introduced it into English thought? 638.
 What is the center of the question of the parentage of animals? 638.
 Where do we find the history of past ages preserved for us? 638.
 What is proved by the generations of snails preserved in the fresh-water lakes of Slavonia? 638.
 Where is the history of the horse family written? 638.
 What does it prove concerning the evolution of the horse? 638.
 What evidences of evolution are found in the stages of growth from the egg to the fully-formed animal? 639.
 How have the controversies about evolution changed? 639.
 What is Lamarck's theory of evolution? 639.
 What is Darwin's theory of natural selection? 639.
 What is Weismann's theory of continuity of the germ-plasm? 639.
 Which of these theories is losing ground? 639.
 How far back does evolutionary thought date? 639.
 Who prepared the way for the theory? 640.
 What debate took place between St. Hilaire and Cuvier? 640.
 Who, in his article on evolution, came near anticipating Darwin? 640.
 Who arrived independently at the same explanation of evolution as Darwin? 640.
 When did the Origin of Species appear? 640.
 What is heredity? 867.

FINE ARTS

- What does the word Art signify? 112.
 What is Dr. Johnson's definition of art? 112.
 What are the useful arts? 112.
 When was warfare one of the highest arts? 112.
 What nation considered agriculture one of the highest arts? 112.
 Where was painting considered one of the meaner arts? 112.
 What are the functions of art and science? 113.
 What is the common ground of the fine arts? 663.
 What are the two great forms of telling the truth? 663.
 Describe "the real work of art". 664.
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 What is the length of the entire boundary of the U. S.? 1967.
 When it is sunset in Maine, is it sunrise in the U. S.? Where? 1967.
 Where are the largest harbors? 1968.
 What indentations on the Atlantic coast? 1968.
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 How far is Cuba from Florida? 1968.
 What are the two elevated regions of the U. S.? 1968.
 Where are the lowlands? 1968.
 How far inland are the Appalachians? 1968, 51.
 What names do they bear in the various states? 1968.
 What are the two highest points of the Appalachians? 1968.
 How far are the Rockies from the Mississippi? 1968, 1622.
 What is the loftiest peak on the continent? 1968.
 What are the navigable rivers of the Atlantic coast? 1968.
 Where is the water-power of New England created? 1968.
 What two rivers have 10,000 tributaries? 1968.
 What makes the prairie regions profitable? 1968.
 What is the Mississippi valley? 1968.
 What are the rivers of the Pacific slope? 1968.
 How many miles of inland navigation in the U. S.? 1968.
 What are some of the natural and interesting features in beauty, grandeur and variety of scenery? 1968.
 What is the climate of the Atlantic states? 1968.
 How does the Pacific climate compare with that of Italy? 1968.
 What makes the U. S. a world in itself? 1969.
 When does the rain fall on the Pacific coast? 1969.
 What minerals give the U. S. first rank in production? 1969.
 What country leads in gold production? 1938.
 How much of the country was originally forest? 1970.
 How many acres of forest are there now? 1970.
 Where is the heaviest stand of timber on earth? 1970.
 What are the most important fish? 1970.
 In what industries does the U. S. lead the world? 1970.
 How much of the world's manufactures come from the U. S.? 1970.
 What are the chemical and allied industries? 1970.
 How does the U. S. stand in agriculture? 1970.
 How many families live on farms? 1971.
 What are the bulk of the exports? 1971.

- How does cotton compare with corn as an asset in the U. S.? 1971.
 How does hay compare with cotton? 1971.
 Where is most of the woodland? 1972.
 What rank does lumbering hold in the U. S.? 1972.
 What port does half of our foreign trade? 1972.
 How many miles of canals are used for transportation? 1972.
 What is the length of the 38 principal canals in the U. S.? 1973.
 How much of the U. S. foreign commerce is carried in foreign ships?
 1973.
 How much of the world's railways are in the U. S.? 1973.
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 Which of the Great Lakes is entirely in the U. S.? 1022.
 What summer resorts are planted in deserts of sand? 1112.
 What was discovered in N. Y. harbor by the Coast Survey? 415.
 Where is the Piedmont region? 1489, 59.
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 Where are the National Parks? 1306.
 What is the great corn state of the Union? 935.
 What city was the chief whaling center of the world? 1324.
 Where are the "Bad Lands" of the United States? 1786.
 What city in the United States is the first naval stores station and
 second cotton port of the continent? 1683.
 What city in the United States is third in importance as to exports?
 1330.
 When were the first sheep introduced in the United States? 1736.
 What state in the Union stands foremost in manufacturing? 1732.
 What state furnishes one third of the gold, silver, copper, lead etc.
 mined in the United States? 1254.
 What is the first manufacturing city in the Union? 1332.
 What range of mountains have twenty-five peaks, the names of five
 of them being those of presidents of the United States? 2079.
 Why is Oregon much warmer than other places of the same latitude?
 1391.
 What lake in the United States contains three thousand islands? 900.
 Which state of the Union was once covered with a great lake? 1786
 What is the longest unnavigable river in the United States? 1786.
 What state in the United States contains 10,000 lakes? 1236.
 What is the highest mountain peak in the United States outside of
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 What is the most famous peak of the Allegheny Mountains? 51.
 What two rivers form the source of the Ohio River? 51.
 What state in the United States contains an extinct crater that is
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 How many miles of railroad in the United States in 1900? 1582.
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 What is the value of the salmon fisheries in the U. S.? 1666.
 In the United States what grain yields the chief crop? 30.

THE NEW ENGLAND STATES.

- How much longer is Maine's tide line than the coast? 1149.
 What is the most important stream of New England? 1449.
 How does the watershed cross the state? 1150.
 What is the temperature of Maine winters? 1149.
 Where is one of the largest salmon pools in the world? 1150.
 What are 2,000,000 bushels of potatoes used for annually? 1150.
 What state has considerable mica deposits? 1325.
 How does Vermont compare with New Hampshire in industrial pro-
 ducts? 2012.
 Why is Massachusetts the least agricultural state in the Union? 1185.

Where is the most notable tunnel in the U. S.? 885.
 How does Boston rank in foreign trade? 249.
 What mines have been worked in Connecticut since 1730? 444.
 What is the character of silverware made in Rhode Island? 1607.

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Why is New York the Empire State? 1331.
 What enables New York to lead in manufactured goods? 1332.
 What is the extent of exports and imports? 1333.
 How many minutes does it take to walk across New York City? 1334.
 What supports the weight of New York City? 1335.
 What are the five boroughs of New York City? 1336.
 What are the Palisades? 894.
 How long is the Erie Canal? 321.
 What two canals are used in New Jersey? 1328.
 Where is the seat of the silk trade? 1327.
 What river forms the entire eastern boundary of Pennsylvania? 1446.
 Where are the largest Bessemer mills in the world? 1447.
 How does Pennsylvania compare with New York in agriculture? 1448.
 In what products does Pennsylvania lead all states? 1447.
 What are the four divisions of the mountain systems of Pennsylvania? 1446.
 What rank does Philadelphia hold as a manufacturing city? 1466.
 Of what importance is Allegheny City? 51.
 How does Delaware compare with Rhode Island in size? 516.
 How does the Mason and Dixon line bound Maryland? 1181.
 What is the leading industry of Maryland? 1182.
 What two canals in Maryland? 1182.
 What are the largest meat-packing industries on the Atlantic seaboard? 164.
 What is tidewater Virginia? 2023.
 What mines of Virginia are the largest in the world? 2023.
 What two products are peculiar to Virginia? 2024.
 What two natural wonders in Virginia? 2023, 1124.
 Why is West Virginia called the Switzerland of America? 2071.
 What is the area of the coal fields? 2071.

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How does North Carolina compare in size with Pennsylvania? 1357.
 Where are the government hatcheries? 1357.
 How does it compare with Kentucky for tobacco? 1357.
 What is said of its wonderful waterpower? 1357.
 How does it lead the southern states? 1357.
 What are the low country and the up country of South Carolina? 1784.
 How does this state lead the world? 1784.
 Where are the beds of phosphate rock? 1784.
 Where is the safest harbor on the Atlantic coast? 371.
 How does Georgia compare in size with New England? 752.
 How many climatic belts in the state? 753.
 Where is the famous Georgia marble found? 753.
 What valuable cotton is grown in Georgia? 753.
 Where is the largest tobacco farm in the world? 753.
 Where is the leading naval stores port in the world? 1683.
 How many clear days in the year in Florida? 684.
 What are its most important crops? Minerals? 684.
 What is the leading industry of the state? 684.
 What are the Florida Keys? 684.
 What is the greatest engineering feat of recent years? 684.
 What city is built on a coral island? 1001.
 What crop is grown in the famous black belt of Alabama? 35.
 What rank has the state in iron ore production? 36.
 How many miles of navigable rivers? 36.
 What is the only seaport of Alabama? 1244.
 How are funds raised for the levees in Mississippi? 1240.
 What is the most valuable tree? 1240.

How does the cotton crop compare with Texas? 1240.
 Why is the state of Tennessee divided into sections? 1889.
 Where is the garden of Tennessee? 1889.
 What do the mountain caverns contain? 1889.
 How is Memphis supplied with drinking water? 1202.
 How does the soil of the east of Oklahoma differ from that of the west? 1377.
 What is the character of the surface? 1376.
 Where are "some of the richest oil fields in America"? 1377.
 How is the name of the state of Arkansas pronounced? 100.
 What success in the culture of rice has the government had? 101.
 Where is the largest oar factory in the world? 101.
 What unique distinction has Hot Springs? 101.
 Where are the famous whetstone quarries? 888.
 How long is the Texas coast line? 1985.
 Where does most of the salt used in the state come from? 1895.
 How does Texas rank in cotton production? 1895.
 Where is the Pan-Handle of Texas? 1895.

THE CENTRAL STATES.

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 How has the climate improved the people? 998.
 What is wonderful about the soil? 998.
 What is said of the hardwood forests? 998.
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 What comment has been made on the climate? 1373.
 What beautiful stone does the state produce? 1374.
 How many million barrels of petroleum are produced? 1374.
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 Why is Cleveland called the Forest City? 409.
 What celebrated pottery is made in Cincinnati? 400.
 How does the state of Indiana rank in size? 920.
 Where is one of the most fertile regions in the world? 920.
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 What prevented Lake Michigan from flowing into the Illinois river? 915.
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 How does the state rank in railroads? 916.
 How much of the U. S. coal fields are in the state? 915.
 What caused mail wagons to disappear in Chicago? 382.
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 Where is the largest canal lock in the world? 1218.
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 What commercial event happens twice a year in Grand Rapids? 793.
 How does Michigan rank as a fruit state? 1219.
 What magnificent park is connected with Detroit? 523.
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 Why is Milwaukee called the Cream City? 1229.
 What rank does Milwaukee hold as a grain port? 1229.
 What three great river systems have their source in Minnesota? 1236.
 What is the best wheat in the world? 1236.
 Where are the Big Woods? 1236.
 Where is the largest primary wheat market in the world? 1235.
 What are the Twin Cities? 1661.
 What is remarkable about the Red River tract of North Dakota? 1358.
 What salt lake in the state has no outlet? 1358.
 What is the enormous yield of wheat? 1358.
 Where are the Bad Lands of South Dakota? 1786.
 What is the principal grain of the state? 1786.
 What industries flourish in the state? 1786.
 What are nearly all buildings in Sioux Falls made of? 1761.

What is the character of the surface of Iowa? 935.
 What are the two hydrographic regions? 935.
 How does Iowa rank in the production of corn? 935.
 What is the annual production of the brick and clay factories of Des Moines? 523.
 Why are there little extremes of heat or cold in Nebraska? 1314.
 What is a drawback to manufacturing? 1314.
 Where are the railways chiefly located? 1315.
 Where is the largest creamery in the U. S.? 1073.
 What curious caverns in the state of Missouri? 1341.
 Why is the climate marked by extremes? 1241.
 What mineral does it produce more than any other state? 1241.
 What is the immense income of the Missouri Botanical Garden? 1660.
 What important geographical position has Kansas? 988.
 What has increased the skill of the Kansas farmers? 989.
 Where is one of the most modern beet-sugar factories in the world? 990.
 In what industry does Kansas rank first? 990.
 How does Kansas stand in wheat production? 990.
 What great industry is carried on in Kansas City, Kansas, and Kansas City, Mo.? 991.

THE NORTHWESTERN STATES.

What is the character of the Bad Lands of Montana? 1254.
 What curious geyser is in Deer Lodge Valley? 1254.
 What makes the climate healthful? 1254.
 How does Montana stand in the production of sheep and wool? 1255.
 Where is the largest smelter in the world? 1255.
 What is the peculiar shape of Idaho? 912.
 What makes the scenery varied and grand? 912.
 What is the law of the state regarding water supply? 913.
 What immense lumber mill at Potlatch? 913.
 How does the climate of Washington differ in the west and the east? 2045.
 How many Federal forest reserves in the state? 2045.
 Through what port does the bulk of Alaskan trade pass? 1715.
 What makes the delightful climate of western Oregon? 1391.
 For what fruits is Oregon famed? 1392.
 Where are the hop farms of Oregon? 1391.
 What port leads the world in lumber exports? 1392.
 Why is the state of Wyoming not adapted for agriculture? 2115.
 What splendid showing is made in wool production? 2115.
 Where is Yellowstone Park? 2115.
 How large is Yellowstone National Park? 2122.

THE SOUTHWESTERN STATES.

How many groups of mineral springs in the state of Colorado? 428.
 How much land did Congress give to the public schools? 428.
 How does the state rank in producing hard coal? 428.
 What prehistoric remains are in the state? 429.
 Where do the breeders of the north and the south meet? 521.
 Where are the greatest natural bridges in the world? 1994.
 What is the altitude of Utah? 1994.
 What is the finest building in Salt Lake City? 1667.
 Are there any fish in Great Salt Lake? 800.
 How does Nevada compare with other states in population? 1323.
 What is irrigation doing for the state? 1323.
 What has given a new impetus to mining? 1323.
 Where is the hottest and driest region of our country? 308.
 How does the climate of the state of California affect the soils? 308.
 Where are the fruit and the gold regions? 309.
 Where are trees 325 feet high and 120 feet in circumference? 309.
 How will the Panama Canal affect California? 310.
 What is the Golden Gate? 1671.

TERRITORIAL POSSESSIONS.

- How much of the United States territory is in Alaska? 37.
 How long is the Yukon River? 37.
 How does the Japanese current affect the climate? 37.
 How much of the salmon product comes from Alaska? 38.
 What was the later name of the Hawaiian Islands? 848.
 How does the temperature vary? 848.
 What important and valuable position has Hawaii? 848.
 What splendid landlocked harbor in Hawaii? 1435.
 How many islands in the Philippine group? 1470.
 How is the climate in July and August? 1470.
 What valuable service is rendered to agriculture by the government? 1470.
 What is the chief product? 50.

CANADA.

- What does Canada comprise? 316.
 Is Canada as large as the United States? 316.
 How does the population compare with Belgium's? 316.
 How many miles between Halifax and Vancouver? 316.
 How many miles from Victoria to Dawson? 316.
 What countries are in the latitude of its southerly portion? 316.
 In what latitude is its most northerly portion? 316.
 What does the older Canada comprise? 316.
 What are the maritime provinces of Canada? 316.
 Where are the eastern provinces? 316.
 Where are the central provinces? 316.
 What is the Pacific province? 316.
 Where does the northern province lie? 316.
 How do the summers and winters compare with those of Europe? 317.
 How does the Japanese current affect the climate? 317.
 Where are precious metals found in abundance? 317.
 Where is the Laurentian Range of Hills? 317.
 How is the lack of coal in this range replaced? 319.
 What three rivers are among the largest in the world? 317.
 What is one of the greatest sources of national wealth? 317.
 How is the irregular triangle of prairie bounded? 317.
 What is Canada destined to become? 317.
 What trade has gained 90 per cent in ten years? 317.
 What is the total of Canada's exports? 317.
 Where is most Canadian wheat shipped to? 317.
 How many wood-pulp mills are there in Canada? 317.
 What are the chief mining provinces? 318.
 What is the value of coal produced yearly? 318.
 What makes smelting economical in Nova Scotia? 318.
 Where are the only nickel producing localities in the world of any consequence? 318.
 What mine contains enough nickel ore to supply the needs of the world for all time? 318.
 How is copper produced in these mines? 318.
 What mines supply the world with asbestos? 318.
 Where are the greatest placer gold-mines in the world? 318.
 Where is one of the richest silver camps in the world? 318.
 What is the value of silver produced in 1908? 416.
 How many miles of the Yukon river are navigable? 2127.
 When was gold discovered in the Klondyke River? 2127.
 What vegetables grow in Yukon? 2127.
 Where is the fishing ground of North America? 318.
 How many Canadian fishermen are employed? 318.
 Where do the salmon impede the flow of the rivers? 318.
 How many government hatcheries are there? 318.
 What is the largest steel-arch railway-bridge in the world? 318.

- Where will be the largest irrigation system on the American continent? 320.
- How much do the settlers pay for irrigation water? 320.
- What railway furnishes a highway round the world? 320.
- Where is the Canadian Northern Railway? 320.
- What will be the total mileage of the Grand Trunk Pacific Railway Co.? 320.
- What is the greatest waterway in the world? 319.
- When will Canada be the Granary of the Empire? 166.
- What province has no waste country? 39.
- In what province is the mean temperature 62.7 degrees in summer and 6.9 degrees in winter? 1682.
- Where is the watershed of the Pacific slope? 269.
- What province is a vast sanitarium? 270.
- Where is one of the best deep water harbors on the Pacific Coast? 2001.
- What river in Canada is 2,400 miles long? 1137.
- What Canadian province has no hotels? 1017.
- Where is one of the chief centers of herring fishing? 1017.
- What Canadian territory is named after Sir John Franklin? 708.
- What city brings its electrical supply 80 miles? 319.
- How much larger is Ontario than the United Kingdom? 1383.
- What are the world scenic features of Ontario? 1383.
- What are the five leading sources of wealth? 1383.
- How do the Great Lakes affect the climate? 1383.
- What peninsula is the finest part of Ontario? 1383.
- What part is a vast fruit farm? 1384.
- What province has no direct taxation for provincial purposes? 1363.
- Where are one fifth of Canadian fish caught? 1324.
- What is the garden province of Canada? 1547.
- Where has an experimental farm been for 50 years? 1548.
- How long was Newfoundland the only English colony in America? 1341.
- What made England a nation of sailors? 1341.
- By whom was Newfoundland colonized? 1341.
- Why is it a good naval base? 1342.
- Where is an immense game preserve? 1342.
- How large is the catch of cod yearly? 1342.
- How much is fit for agriculture? 1342.
- Where is one of the most valuable iron mines in the world? 1342.
- What is the chief center of salmon fishing? 1342.
- What are the Banks of Newfoundland? 1342.
- What is the nearest port in America to Europe? 1342.
- Why are all school examination papers sent to England for marking? 1342.
- How does Quebec compare in size with the British Isles? 1571.
- Is Montreal nearer to Europe than New York? 1572.
- When were the provinces of Alberta and Saskatchewan added to the Dominion? 320.
- How are the Northwest Territories governed? 1360.
- What do the Northwest Territories comprise? 1360.
- How could the Mackenzie river be made the longest inland water-route in the world? 1137.
- How is trade carried on in the Mackenzie District? 1138.
- What is most interesting about the Keewatin District? 893, 995.
- From what province will Canada get iron ore in the future? 1966.
- How does the Labrador current benefit the fisheries? 1016.
- Why is Quebec cut off from the Atlantic? 1571.
- What per cent. of the population of Quebec are Catholics? 1572.
- How many square miles of forest land in Quebec? 1572.
- How long is Victoria bridge, Montreal? 266.
- What beautiful cataract near the Dominion capital? 374.
- What makes navigation of the Bay of Fundy dangerous? 724.

- What is the most northerly of Canada's great lakes? 798.
 What city on the Atlantic is strongly fortified? 827.
 What is the largest river in Canada? 1137.
 What cataract in Quebec is 250 feet high? 1257.
 What portion of Newfoundland is covered by lakes and rivers? 1342.
 What does the name Niagara signify? 1345.
 What volume of water per minute passes over Niagara Falls? 1345.
 What is the estimated amount of power at Niagara? 1346.
 Why was Prince Edward Island called a "low and beautiful land"? 1547.
 What is the total area of the Rocky Mountains? 1622.
 What island is called "the sailor's grave"? 1651.
 What is the nearest port in America to Europe? 1658.
 Where are the headquarters of the consolidated Six Nations? 260.
 How much money has Canada spent on canals? 319.
 How high is the head of Lake Superior above the head of tidewater? 1659.
 What are the total imports of Canada? Also exports? 317.
 How long is the St. Clair tunnel? 1656.
 Where is that natural wonder called the "reversible falls"? 1658.
 What is the value of cheese exported? 317.
 What is the value of the fish catch per year? 318.
 How many miles of railway in operation in Canada? 318.
 Where is irrigation employed extensively in Canada? 320.
 What is the annual value of Canada's timber exports? 317.
 How much nickel has been taken from the Sudbury mines? 318.
 How much gold has been mined in Canada? 318.
 What parts of Canada have supplied the most gold? 318.
 What is Canada's coal area? 318.
 How much land has Ontario left for settlement? 1383.
 What city is at the head of ocean navigation? 1258.
 Where is the famous Cobalt mining center located? 416.
 How rapidly is Ontario being settled? 1384.
 Where is the Agricultural College of Ontario? 810.

MEXICO AND CENTRAL AMERICA.

- How large is Mexico? 1214.
 What is the length of the coast line? 1214.
 What is the one good harbor? 1214.
 How high is the tableland of Mexico? 1214.
 What peak is 17,540 feet high? 1214.
 What is the largest river and lake of Mexico? 1214.
 How many salt lakes in the valley of Mexico? 1214.
 Where is the region of perpetual spring? 1214.
 Where is an extensive field for the botanist? 1214.
 What are the 353 species of birds famed for? 1214.
 What regions have been exploited for 400 years? 1214.
 Why has Mexico been called a "horn of plenty"? 1215.
 What are the products of the lowlands? 1215.
 Where are coffee and cereals grown? 1215.
 How many crops of corn can be grown in a year? 1215.
 What is the Department of Promotion? 1215.
 What rank does Mexico hold in exporting hides and skins? 1215.
 What interoceanic railway was opened in 1907? 1216.
 What is the prevailing religion? 1216.
 Are all religions tolerated? 1216.
 What kind of government has Mexico? 1216.
 What ancient people founded the City of Mexico? 1213.
 What cathedral was a century in building? 1214.
 What drains the valley of Mexico? 1214.
 What are the boundaries of Central America? 60.
 How does it differ from North and South America? 60.
 What are the area and the population? 60.

What is the largest inland lake south of the Great Lakes? 60.
 How much rain falls in Panama? 60.
 What are the chief products? 60.
 What ancient people made their home here? 60.
 Which country is a British possession? 60.
 Where is the republic of Panama? 1415.
 When was the Panama Canal first talked of? 1415.
 Why did Panama secede from Colombia? 141.

SOUTH AMERICA.

What are the length and width of South America? 61.
 In what direction is it from North America? 61.
 What important inlets on the coast? 61.
 What mighty range of mountains on the western coast? 61.
 What is the highest point on the western hemisphere? 61.
 Why have the three vast river systems no parallel? 61.
 What lake is over 12,000 feet above tidewater? 61.
 How does the rainfall differ from that of North America? 61.
 What is the character of the forests? 61.
 What is said of the coffee, rubber and wheat of South America? 62.
 Where are June, July and August the winter months? 239.
 Where is the Amazon 60 miles wide? 57.
 What river pours 52,000,000 cubic feet of water into the ocean every minute? 1501.
 What is the length of the coast line? 426.
 What is the only break in the western range of the Andes? 426.
 How do the rivers mostly flow? 426.
 What was the value of precious metals taken by Spain in three centuries? 426.
 What are the principal exports? 426.
 How long is the seaboard of Ecuador? 580.
 Where does it rain nearly all the year round? 580.
 What is the state religion? 580.
 Who are the merchants and landholders? 580.
 What place is famous for Panama hats? 580.
 What country has a lake whose surface is covered with pitch? 122.
 What is the character of the country of Venezuela? 2008.
 What links the Orinoco and the Amazon? 2008.
 What is the basis of Venezuela's wealth? 2009.
 The Inca Indians form what part of the population of Peru? 1456.
 How does the length of its coast compare with our Atlantic coast? 1456.
 Where is the most elevated tableland in the world, next to that of Tibet? 1457.
 How long does it take to travel from Lima to Iquitos? 1457.
 How does Bolivia compare in size and population with Illinois and Chicago? 238.
 What island was the home of the Incas? 238.
 What hinders the development of the mines? 239.
 Why is Chile called the shoestring republic? 386.
 What is the third largest city in South America? 387.
 What is the chief source of the nation's wealth? 387.
 Why are the houses of Santiago only one story high? 1676.
 The Argentine Republic is 22 times as big as what state? 94.
 What is the second largest river system in the world? 94.
 Where are the famous wheat fields? 94.
 Why will it be one of the great producing nations of the world? 94.
 How is Buenos Ayres connected with the U. S.? 285.
 What is one of the most fertile regions of South America? 1419.
 What is Paraguay tea? 1419.
 What is the temperature during the summer months of December, January and February? 1419.
 How does Uruguay compare with Rhode Island in size? 1992.

What is the character of the country? 1992.
 Is Brazil as large as the United States? 261.
 What is the most remarkable system of waterways on our planet? 261.
 How does Brazil lead in variety of plants? 262.
 What is the language spoken? 262.
 Who pays the salaries of the Catholic prelates? 262.
 What are the five sections of Guiana? 811.
 How is British Guiana rich? 811.
 Where are the inhabitants gradually diminishing? 811.
 To what country do the Falkland islands belong? 648.
 Who is called the king of the penguins? 648.
 Why has Patagonia disappeared from the map? 1428.

EUROPE.

How does Europe rank in size compared with other continents? 632.
 How does it rank as to density of population? 633.
 How does Europe compare in size with the United States? 632.
 How is Europe divided physically? 632.
 What portion of the continent is classed as plains? 632.
 In what country is the highest summit? 632.
 What sea enters Europe from the Arctic Ocean? 632.
 What seas enter from the Atlantic Ocean? 632.
 How do the lakes in Europe compare in size with lakes in America and in Africa? 632.
 Which is the largest river of Europe? 632.
 What is the general climate of Europe? 633.
 Does the Gulf Stream affect the climate of western Europe? 633.
 What river of Europe contains a passage known as the Iron Gate? 502.
 Do certain winds affect the climate of Europe? 633.
 Is it probable that most of the fruits now grown in Europe are natives of the country? 633.
 To what races of people do the Europeans belong? 633.
 What is the prevailing religion in Europe? 633.
 What race track in Europe is said to be the most famous one in the world? 622.
 For what has the village of Interlaken, Switzerland, become famous? 932.
 What is the largest roof in Europe unsupported by pillars? 1408.
 What famous hunting grounds have recently been made one of the most beautiful pleasure grounds of Europe? 622.
 Where are the finest squares in Europe? 1954.
 What is the finest Egyptian museum in Europe? 1954.
 What is the most aristocratic watering place in Europe? 335.
 What substitute for coffee is used throughout Europe? 757.
 What is the largest military post on the Mediterranean Sea? 1928.
 What are the most celebrated tunnels in Europe? 1951.
 What is the oldest university of central Europe? 1987.
 What universities of Europe are on the German model? 1987.
 In what country of Europe is education most widely spread? 756.
 How many universities are there in Europe? 1987.
 For what was the university of Bologna especially celebrated? 1987.
 What is the only European nation not having compulsory military service? 108.
 What are the most famous objects of grandeur and beauty in the Alps? 55.
 What mountains are called the playground of Europe? 55.
 What city government controls the opera-houses, theaters and street railways? 283.
 Where is the highest inhabited spot in Europe? 634.
 What is the third largest city of Europe? 204.
 Which is the most thickly populated country in Europe? 195.
 Where are found the largest coal-fields of Europe? 756, 1926.

What is Europe's average population to the square mile? 633.
 Where is Pompeii? 1524.
 Why did the Phœnicians give the name to Europe? 632.
 What gives it such an extensive coast line? 632.
 Where are the two mountain systems? 632.
 What is the center of the mountain system in the south and west? 632.
 What waters nearly surround Europe? 632.
 What islands cluster around the mainland? 632.
 What are the largest rivers. 632.
 Where do the myrtle and the date-palm grow? 632.
 Where did the plants of southern Europe come from? 633.
 Name some of the wild animals of Europe? 633.
 What is the best method of classifying the races? 633.
 How many languages are spoken in Europe? 633.
 What geographical changes were made in Europe in the last century?
 635.
 What is the longest river of Europe? 2028.
 How is the Danube controlled? 503.
 Where is the most difficult passage of the Danube? 502.
 What is one of the most noted rivers in the world? 1606.
 What sea has long been one of the commercial highways of the
 world? 1360.
 What prevents the Mediterranean from evaporating away? 1198.
 How many railroad tunnels pierce the Alps? 55.
 Where is the Balkan peninsula? 161.

GREAT BRITAIN AND IRELAND.

What are the boundaries of Great Britain? 798.
 What is the greatest length of the kingdom? 798.
 Why is the geological formation of the country interesting? 798.
 What is the greatest natural wealth of Great Britain? 798.
 Why has Great Britain one of the healthiest climates in the world? 798.
 How much of the world's shipping is done by British vessels? 798.
 What countries compose the United Kingdom; what the British Em-
 pire? 799.
 What are the shape and size of England? 615.
 What makes its coast line so long? 615.
 How does it compare in size with New York state? 615.
 How much of its area is productive? 615.
 What are the yearly exports and imports? 615.
 When did agriculture represent half the wealth of the nation? 615.
 What port has one-third of the foreign trade of the whole kingdom?
 1103.
 What is the area of London? 1110.
 What makes London the wealthiest city in the world? 1111.
 What is the North Channel, the Irish Sea and St. George's Channel?
 937.
 What are the provinces of Ireland? 937.
 What is the size of Ireland? 937.
 What advance has the country made in recent years? 937.
 What makes Dublin one of the most beautiful capitals in Europe? 556.
 What is the Cove of Cork now called? 1574.
 How does Scotland compare with Indiana in size? 1707.
 Why are few places more than 40 miles from the sea? 1707.
 How long is the Clyde? 1708.
 How many mountain peaks above 3,000 feet? 1708.
 How do the cool summers affect agriculture? 1708.
 What is said of salmon in Scotland? 1708.
 What is the state religion? 1708.
 What is the source of Glasgow's prosperity? 772.
 Where is Fingal's Cave? 674.

FRANCE.

- How does France compare in size with Europe? 703.
 How long is its coast line? 703.
 What are its boundaries? 703.
 What is the length of its land frontier? 703.
 What is the character of the southeastern half of France? 703.
 What is the highest peak of the Cevennes Mountains? 703.
 What other mountain ranges in France? 704.
 What two widely different regions about the Cevennes Mountains? 703.
 What mountains separate France from Spain? 704.
 What famous tunnel leads into Italy? 704.
 What are the largest rivers? 704.
 What large island on the coast belongs to France? 704.
 What proportion of the people live in the country? 705.
 What is the high value of an acre of market-gardening ground? 705.
 What industries show the artistic taste of the people? 705.
 What rank does France hold in silk manufacture? 705.
 How is internal commerce carried on? 705.
 What university has 18,000 students attending? 706.

GERMANY.

- What was the one imperial province of Germany? 756.
 Where is the high tableland of Germany? 756.
 What is the highest peak in Germany? 756.
 What is the character of northern Germany? 756.
 What are the drainage basins? 756.
 How are the great river systems connected? 756.
 Where is the largest iron deposit in Europe? 756.
 Where is the largest coal-field in Europe? 756.
 Where is one-half of the world's zinc produced? 756.
 Name some other natural resources of Germany? 756.
 What is used as a substitute for coffee? 757.
 Where does the making of toys and wooden clocks flourish? 757.
 How much beer is brewed yearly? 757.
 What is the size of the German mercantile fleet? 757.
 How long did a German have to serve in the army? 757.
 Why are Germans called Dutchmen? 757.
 What is the density of population in Germany? 757.
 What are the largest cities of Germany? 757.
 What were the German colonies? 757.
 Where is the street called Unter den Linden? 204.
 What are the most beautiful gates of Munich? 1277.

AUSTRIA-HUNGARY.

- How did it compare in size with Texas? 144.
 What is the meaning of the name? 145.
 What mountains in Austria-Hungary? 145.
 How does the climate vary throughout the country? 145.
 What is the only mineral not found in this country? 145.
 Where are the richest lead-mines in Europe? 145.
 What mines were worked by the Celts and Romans? 145.
 How many people engage in tilling the soil? 145.
 Where is the granary of Europe? 145.
 For what animals is Hungary famous? 145.
 In what products does Austria lead? 145.
 What city leads Europe as a milling center? 145.
 How many grades of wheat are used? 145.
 Where are half the glass factories? 145.
 What does America buy and sell from Austria Hungary? 145.
 How long is the Danube's course? 145.
 What is the size of the merchant-marine? 145.
 How is most of the ocean freight transported? 146.

SPAIN AND PORTUGAL.

- What waters wash the coast of Spain? 1788.
 How is it separated from Africa and France? 1788.
 What islands on the coast belong to Spain? 1788.
 What is the area of Spain? 1788.
 How many rivers are there in Spain? 1788.
 Where are the richest quicksilver mines in Europe? 1788.
 What per cent. of the people are engaged in farming? 1788.
 What is the character of the Mediterranean shore? 1788.
 What is one of the principal exports? 1788.
 What are the chief cities of Spain? 1788.
 What are the length and breadth of Portugal? 1534.
 What is the total area with the Azores and Madeiras? 1534.
 How far are the Azores from Portugal? 149.
 For what has the island of Madeira long been noted? 1141.
 How does the population of Portugal increase? 1534.
 What is the most important mountain range in Portugal? 1534.
 What do the ocean breezes do for the climate? 1534.
 What is the condition of agriculture? 1534.
 What is port wine? 1534.
 Where are the manufactures located? 1534.
 What are the chief mineral products? 1534.
 How long must each male Portuguese serve in the army? 1534.
 Where is one of the oldest universities in Europe? 1534.
 Where was one of the greatest earthquakes on record? 1079.
 What city in Portugal has a crystal palace? 1387.

ITALY.

- How are the limits of Italy strongly defined? 946.
 What is the shape of the peninsula? 946.
 What is the character of northern Italy? 946.
 What are the great plains of Italy? 947.
 What mountain systems in Italy? 947.
 What are the most remarkable volcanoes? 947.
 Are the Italian rivers navigable? 947.
 What are the famous mountain lakes? 947.
 What noted marble comes from Italy? 947.
 What is the character of the people? 947.
 How many of the people are engaged in agriculture? 947.
 What are the main products? 947.
 What is the state religion? 947.
 How does the navy of Italy rank? 947.
 Why must Rome import all the necessities of life? 1630.
 What famous plant that once grew in Egypt now grows in Sicily? 1418

RUSSIA.

- How large is the Russian Empire compared with the continent of Europe? 1645.
 European Russia is what part of the whole empire and contains what portion of the population? 1645.
 What ocean was the whole sea coast of Russia till the end of the seventeenth century? 1645.
 What sea coast is now of chief importance to Russia? 1645.
 What is the principal range of mountains? 1645.
 What large rivers flow north, and which flow south? 1645-6.
 How wide is the plain crossing central Russia? 1645.
 What two great rivers have been connected by a canal? 1646.
 What are the four chief cities of Russia? 1646.
 What races of people make up the population of Russia? 1646.
 What kind of a government has Russia? 1647.
 To how many boards is the administration of the empire intrusted, and what power has each board? 1647.
 The peasant class are what portion of the population? 1646.
 What minerals are found in Russia? 1646.

- What are the chief articles of export? 1646.
 What is a great help to the inland trade? 1646.
 What is the monetary value of manufactured products? 1646.
 What part of Siberia is very fertile and is the granary of the country? 1750.
 When was the trans-Siberian railroad opened? 1750.
 What is the climate of Siberia? 1750.
 How many degrees below zero has the thermometer been known to register? 1750.
 What town is called the Manchester of Poland? 1107.
 In what two continents does the Russian empire lie? 1645.
 What are the main divisions of Russia? 1645.
 What part of the land surface of the globe is Russia? 1645.
 What is the present seaboard of Russia? 1645.
 Where is one of the finest roadsteads in the world? 1645.
 Where are the chief Russian seaports? 1645.
 What does the Caspian sea furnish to Russia? 1645.
 What immense plain crosses European Russia? 1645.
 What rivers rise in this plain? 1645.
 What is the population of Russia? 1646.
 What are the five classes of the Russian people? 1646.
 What makes the wide diversity of climate? 1646.
 Where are the minerals found in Russia? 1646.
 How much of the land belongs to the peasants? 1646.
 How many miles of canalized rivers? 1646.
 What is the war-footing of the army? 1647.
 What was the extent of the former kingdom of Poland? 1512.
 What is the meaning of the word Finland? 674.
 What canal runs through granite rock in Finland? 675.
 Why is Caucasus called the mountain of languages? 353.
 What separates the Russian and English possessions in Asia? 1955.
 What is the coldest country in the world? 1749.
 What are the tundras of Siberia? 1750.
 How was the barrier of Lake Baikal overcome in building the Siberian railroad? 1751.
 What is the chief naval station of Russia in Siberia? 2026.

SCANDINAVIA.

- What countries belong to Denmark? 520.
 What are the boundaries of Denmark? 520.
 How does the skai damage the crops? 520.
 What is the commonest tree in Denmark? 520.
 What is the value of the fisheries? 520.
 How much good soil in Denmark, and how many farmers are there? 520.
 Are the Danes well-educated? 520.
 To what church must the king belong? 520.
 What separates Norway from Sweden? 1361.
 Who are the only inhabitants of the mountains? 1361.
 How does the Gulf Stream affect the climate? 1361.
 What is the main occupation of the people? 1361.
 What is the condition of the mineral wealth? 1361.
 What interesting establishment in Christiania? 395.
 What are the length and width of Sweden? 1854.
 Where are the timber-lands and good pasturage of Sweden? 1854.
 Where are the iron-mines and copper works located? 1854.
 How much of the surface do the lakes cover? 1854.
 How long between summer and winter? 1854.
 To what extent is grain raised? 1854.
 How much of the land is covered by forests? 1854.
 How do the soldiers pay for their support? 1854.
 What is the national religion of Sweden? 1854.

GREECE.

- What is the geographical location of Greece? 800.
- How are its provinces divided? 800.
- What is the area of Greece? 801.
- What mountains on the north separate it from the rest of Europe? 800.
- Name some of the islands which are formed by an extension of the mountains forming the northern boundary? 800.
- What can you say of the rivers, their size and direction? 800.
- To what race of people do the Greeks belong? 801.
- What are thought to have been the habits of the early Greek tribes? 801.
- From what direction is it thought that the early tribes entered Greece? 801.
- By what name did those early tribes call themselves? 801.
- By what name does Homer speak of the early tribes? 801.
- To what language is that of the Greeks closely allied? 801.
- What is the earliest account we have of the Greeks' religion? 801.
- What was the form of their worship? 801.
- What is the modern Greek church called? 801.
- How is the Greek church supported? 801.

TURKEY.

- What countries are comprised in the Ottoman Empire? 1955.
- What are the total area and population of these countries? 1955.
- What races make up the Turkish subjects? 1955.
- What are the largest salt lakes? 1956.
- What are the principal mountain ranges? 1956.
- What is the climate of the country? 1956.
- What flower is extensively cultivated? 1956.
- Are the resources of the country well-developed? 1956.
- What is the religion and law of Turkey? 1956.
- How is the sultan regarded, and how great is his power? 1956.
- To what extent is polygamy practiced? 1956.
- What attitude does the government take toward education? 1956.
- Who is the grand vizier? 1956.
- Who is the Sheik-ul-Islam? 1956.
- Who is the present sultan? 1956.
- How many sultans have there been since the conquest of Constantinople? 1956.
- Of whom are military services required? 1956.

HOLLAND.

- Where is Holland situated? 878.
- Is Holland above or below the level of the sea? 878.
- For what double purpose are the canals used? 878.
- What double purpose is served by the dikes? 878.
- What are the chief agricultural industries? 879.
- What are its chief manufactures? 879.
- What has lately become an important item of manufacture? 879.
- In what has Amsterdam the largest trade in the world? 879.
- What city is the capital of Holland? 879.
- What island possessions has Holland in the East Indies? 879.
- In the West Indies? 879.
- What are the three largest cities in Holland, not including The Hague? 879.
- Who is the present ruler of Holland? 879.
- What is Holland's busiest port? 1637.

SWITZERLAND.

- Locate Switzerland. 1857.
- What is said of the surface of Switzerland? 1857.
- Which are the principal mountain chains, and what may be said of them? 1857.

Give the location and area of the plain of Switzerland. 1857.
 What hill country lies to the east of this tableland and between what waters? 1857.
 What are the main divisions of northern Switzerland? 1857.
 Into what is the Alpine region divided? 1857.
 By what rivers are the valleys of Switzerland drained? 1857.
 By what are the higher mountains covered? 1857.
 What is said of the glaciers? 1857.
 Where is the lowest part of Switzerland? 1857.
 What is said of the forests of Switzerland? 1857.
 How are the trees, cut on the heights, conveyed to the valleys below? 1857.
 What is the chief business of the people of Switzerland? 1857.
 In what part of Switzerland is farming carried on? 1857.
 Where are the manufactures chiefly carried on? 1857.
 What is said of trade in Switzerland in proportion to population as compared with that of other European countries? 1857.
 What are the chief imports? 1857. Exports? 1857.
 How is Switzerland governed? 1857.
 What is said of the Federal legislature of Switzerland? 1857.
 By whom is the president of the republic elected? 1857.
 By whom is most of the land owned? 1857.
 What are the military requirements of Switzerland? 1857.
 What languages are spoken in Switzerland? 1857.
 What cities are the centers of the Protestant part of Switzerland? 1857.
 What is the population of Switzerland? 1858.
 Where does Catholicism prevail? 1857.
 What are the educational requirements of Switzerland? 1857.
 What is said of the higher and specialized schools? 1857.
 What is said of the postoffices, railroads etc. of Switzerland? 1858
 Under whose control are they? 1858.
 Name the chief towns of Switzerland. 1858.

ASIA.

How does the continent of Asia rank in size? 119.
 What does the name mean? 119.
 What portion of the land area of the world is in Asia? 119.
 Which is the greatest mountain system of Asia? 119.
 What portion of Asia's area is in its peninsulas? 119.
 What three large peninsulas are in southern Asia? 119.
 What sea bordering Asia on the southwest has become a highway of the first importance? 119.
 What two great tablelands has Asia, and what is their location? 119.
 What three inland bodies of water has Asia? 119.
 What are the names of several of the larger rivers of Asia? 119.
 What is the location of the islands relative to the southeastern coast? 119.
 What are the chief productions of Asia? 119.
 To how many different groups do the people of Asia belong? 119.
 What important junction does Allahabad form? 51.
 What city is surrounded by a mud wall 24 feet high? 237.

INDIA.

What five natural divisions has India? 918.
 What large river systems has India? 918.
 How many well-marked seasons has India, and what are they? 918.
 Of the domesticated animals what ones do the work of agriculture? 918.
 What domestic animals are held sacred? 918.
 Of the wild beasts, which one is the most feared? 919.
 What are the chief agricultural crops? 919.
 What portion of the country is available for farming? 919.

What European country has the greatest trade with India? 919.
 Politically, India is a dependency of what nation? 919.
 For purposes of administration, India is divided into how many great divisions? 919.
 What is the occupation of two-thirds of the people? 919.
 To what religion do most of the people belong? 919.
 How early were modern missions established? 919.
 What city of India is entered by metaled roads through thirteen gates? 1021-2.
 What famous palace has made Delhi, India, noted? 517.
 Why do the Hindoos refuse to kill the cobra? 417.

JAPAN.

What is the wealth of Japan, and what is the national debt? 964.
 How much of Japan's trade is carried on with the United States? 964.
 What has made navigation safe? 964.
 What is the mileage of the railways? 964.
 How do the chief cities compare with Chicago, Milwaukee, San Francisco and New Orleans? 964.
 What is said of cloisonne? 965.
 Which industries are increasing, and which are decreasing? 965.
 What country is under the protection of Japan? 1157.
 What naturally impregnable naval station now belongs to Japan? 1529.

CHINA.

By what name do the natives call their kingdom? 389.
 What provinces or divisions has the empire? 389.
 What emperor, B. C., formed China from eight kingdoms into one great empire? 384.
 What is the most extensive mountain range, and of what great mountain system is it a spur? 389.
 How does this mountain range divide China? 389.
 What is that portion of China between this range of mountains and the Great Wall called? 389.
 Describe the earth covering most of this great plain. 389.
 What part of China is called the granary of the nation? 389.
 What two rivers are the largest in China? 389.
 What name is given the river Ho because of its many floods? 389.
 What canal joins the northern and southern parts of the empire, and when was it built? 389.
 How long is the Great Wall? 389.
 How does the emperor open the farming season, and how does the queen start the work among the silkworms? 390.
 How long has the silkworm been cared for in China? 390.
 What articles are used as food, not common in European countries? 390.
 What is the great beverage? 390.
 What are the best buildings seen? 390.
 Has China's mineral wealth been developed? 390.
 What manufactured article is superior to any made in the west? 390.
 What two articles are the chief ones of export? 390.

AUSTRALIA.

To what European power does Australia belong? 142.
 What is the size of Australia? 142.
 What ranges of mountains are found in Australia? 142.
 What river is the only large one in Australia? 142.
 What is the nature of a large part of the interior? 142.
 Where is the lake district, and what are the four largest lakes? 142.
 What is the general climate of Australia? 142.
 Do the native people differ from those of other continents? 142.
 What is the chief occupation of the natives? 142.
 What is their sense of right and wrong? 142.
 How many political divisions has Australia? 143.

- What new form of government went into effect the first day of this century? 143.
 What portion of the people are agriculturists? 143.
 What are some of the exports? 144.
 What city is the largest in Australia? 143.
 What city has a first class naval station? 144.
 Why was the Australian ballot system invented? 144.

AFRICA.

- What are the greatest length and the greatest width of this continent? 22.
 How is it joined to Asia on the northeast and separated from Europe on the northwest? 22.
 What seas surround Africa? 22.
 What is the northern end of the continent? 22.
 What mountains run parallel to the Mediterranean coast? 22.
 What have recent explorations determined about the Sahara desert? 22.
 What region south of the Sahara? 22.
 How is the southern end of the continent marked? 22.
 What are the great rivers of Africa? 23.
 What is the drainage area of the Nile? 23.
 Where are the great lakes of Africa found? 23.
 What is said of the climate of Africa? 23.
 What is the most fatal region for Europeans and Americans? 23.
 Where are the minerals found? 23.
 What animal has, it is said, never been domesticated? 23.
 Have they ever been domesticated? 604.
 What fly's bite is fatal to cattle? 23.
 Where are the Hottentots and the pygmies? 23.
 What states of Africa are more or less independent? 23.
 What nations have colonies in Africa? 24.
 What is the total area of the British colonies? 328.
 What is the principal harbor of Cape Colony? 328.
 What forms the watershed of the country? 328.
 How does the eastern part differ from the western part? 328.
 Why has the Cape long been known as a health resort? 328.
 Describe the immense reservoir that is used for irrigation. 328.
 What did the natives formerly use instead of tobacco? 328.
 What has become of the native animals? 328.
 What birds are found here? 328.
 How large is the Kimberly diamond mine? 329.
 What are the principal exports and imports? 329.
 How many miles of good roads and railroads in Cape Colony? 329.
 What are the chief towns? 329.
 What modern improvements in Cape Town? 330.
 How does the Transvaal compare with Arizona in size? 1937.
 What does the land of the Transvaal mainly consist of? 1937.
 What makes the climate dry? 1937.
 What is the character of the soil? 1937.
 What industry is supreme? 1938.
 What is the Orange River Colony? 1389.
 What is the occupation of the Basutos? 180.
 What are the products and imports of Natal? 1305.
 Where has asbestos been discovered? 2137.
 What is the Central Africa Protectorate? 24.
 Why was it founded? 1366.
 What are the five provinces of Uganda? 1964.
 What is killing off the people of Uganda? 1964.
 How many miles of postroads and railroads in Rhodesia? 1607.
 What are the products of Nigeria? 1349.
 What town has a fine and safe harbor? 1021.
 What three countries own Somaliland? 1780.

What country with 32 miles of coast extends inward 335 miles? 1920.
 What is the second longest river in the world? 1351.
 What lake forms the reservoir for the Congo River? 442.
 What country controls the trade of the Niger River? 1349.
 How much of the Zambezi River is navigable? 2129.
 Is Lake Victoria considered the source of the Nile? 2020.
 What is the Assuan Dam? 125.

EGYPT.

How far up the Nile does Egypt extend? 590.
 What is the main feature of the country? 590.
 What part of the country is called lower Egypt? 590.
 Into how many divisions is Egypt divided? 590.
 What peculiarity has the Nile valley with reference to rain? 590.
 At what season of the year does the Nile begin to rise? 590.
 How is the course of the river broken? 590.
 What are the chief agricultural crops of Egypt? 590.
 What fruits are found in Egypt? 590.
 What religion prevails in Egypt? 590.
 What three gods were found all over ancient Egypt? 590.
 For what purpose were the pyramids used? 591.

GEOLOGY

Who was the father of American geology? 1139.
 With what does the science of geology deal? 747.
 Why is the idea that geology deals with rocks only, inadequate? 747.
 In working out the history of the earth, what has been the line of approach? 747.
 How is the land carried away into the sea? 747.
 How are sandstone and shale then formed? 747.
 What is inferred from this? 747.
 From what other sources do geologists learn to interpret rock formations? 747.
 Where do geology and astronomy meet? 747.
 What is the rival to the nebular hypothesis? 747.
 What does it affirm? 747.
 What are the three great classes of rocks? 747.
 What are the three great agents in the metamorphism of rocks? 748.
 What does dynamic geology deal with? 748.
 What does petrography deal with? 748.
 How may structural geology be defined? 748.
 What does physiographic geology deal with? 748.
 With what other divisions of the subject is it connected? 748.
 What is dealt with in paleontologic geology? 748.
 Why is historic geology a broad phase of the subject? 748.
 Why is economic geology a practical phase of the subject? 748.
 What are the five eras of geologic time? 748.
 What was formed during the Archean era? 748.
 What formations were deposited during the Proterozoic era? 748.
 How long is this era supposed to have been? 748.
 What systems of rocks were deposited during the Paleozoic era? 748.
 How are these systems distinguished from one another? 749.
 How great was the range of life in the Cambrian period as compared with that of the present? 749.
 In what period have fish remains been found? 749.
 What period is known as the Age of Fishes? 749.
 During what period were the great coal deposits made? 749.
 When did reptilian life begin? 749.
 How is it known that the relations of sea and land differed at different times? 749.
 Does it appear that the deep sea bottom has ever been land? 749.
 What life existed in the Mesozoic era? 749.
 In what period of this era were reptiles the dominant type of life? 749.

What period do mammals date from? 749.
 In what period do remains of birds appear? 749.
 When were the chalk deposits made? 749.
 When did modern types of plants and fishes appear? 749.
 What is the Cenozoic era? 750.
 Why was the Pleistocene period remarkable? 750.
 Where were the ice sheets developed? 750.
 What various conjectures have been made concerning the age of the earth? 750.
 How are the ages of the various eras thought to compare? 750.
 What has been the character of the climatic changes? 750.
 What may be said as to volcanic activity? 750.

PALEONTOLOGY.

What does paleontology deal with? 1409.
 What are the three divisions of the science? 1409.
 Do all the systems of rocks contain fossils? 1409.
 What is it the province of paleontology to determine? 1409.
 What is involved in the first point? 1409.
 What is meant by cosmopolitan faunas and colonial faunas? 1410.
 What is involved in the second point? 1410.
 What does the third point consider? 1410.
 What would a complete knowledge of paleontology involve? 1410.
 How does paleontology aid in determining the age of rock formations? 1410.
 What is paleontologic geology? 1410.
 What is paleontologic zoology? 1410.
 What is paleontologic botany? 1410.
 Are all animals and plants of higher types than their ancestors? 1410.
 Is evolution ascent or differentiation? 1410.
 What is differentiation? 1410.
 Does the succession of fossils demonstrate the doctrine of evolution? 1410.
 Why is present knowledge of ancient life very far from complete? 1410.

HISTORY

EGYPT.

What was the condition of the Egyptians when they first became known in history? 591.
 What system of writing had they? 591.
 Why is the early history dated by dynasties? 591.
 Who founded the city of Memphis? 591.
 What marks the site of the ancient city today? 1202.
 What was the duration of the first dynasty? 591.
 Who built the pyramids of Ghizeh? 591.
 How many pyramids are there in Egypt? 1565.
 How large is the Sphinx? 1797.
 When did the shepherd-kings arise? 591.
 What famous Hebrew of Scripture was prime minister to one of these kings? 591.
 What is the capital of these kings called in the Bible? 906.
 How did the kings of Egypt get the name of Pharaohs? 1464.
 What are the most famous ruins in Egypt? 1898.
 Who raised Egypt to its highest point of glory? 591.
 What inscription did Rameses I have over his library door? 1063.
 Under what king did the Israelites depart out of Egypt? 1585.
 In what dynasty did Egypt come into touch with Greece and Judea? 591.
 Who planned the Suez Canal and conquered Palestine? 591.
 How was Moses reared? 1269.
 When was Egypt conquered by the Persians? 591.
 How did Cambyses die? 313.

HISTORY

- What was the condition of agriculture among the ancient Egyptians? 26.
What system of writing had they? 591.
What American people used the same kind of writing? 873.
What sciences did the Egyptians know? 591.
What is the proof of their engineering skill? 591.
What mechanical tools were invented and used? 591.
How was papyrus made 1418.
What did it cost to embalm a body in ancient Egypt? 1277.
Why did the Egyptians embalm their dead? 591.
What were pyramids, obelisks and sphinxes used for? 591.
What are "Cleopatra's Needles"? 1368.
What animal was especially sacred among the Egyptians? 591.
How was the key to their hieroglyphics first obtained? 1635.
How did their artists always represent the king? 668.
When was Alexandria founded? 591.
How did Sostrates deceive the king who built the famous lighthouse? 45.
What was the largest collection of books ever gathered before the invention of printing? 46.
What battle marked the end of Cleopatra's reign? 591.
Who placed Cleopatra on her throne? 408.
When and by whom was Cairo founded? 591.
How far are the pyramids from Cairo? 304.
Who were the Mameluke kings? 1154.
Who introduced the beginnings of European civilization? 592.
Under what ruler was the Suez Canal cut? 592.
What ruler suppressed the slavetrade? 592.
Since when has England had a controlling influence in Egypt? 592.
What was the unfortunate end of the brave Gen. Gordon? 592.
What valorous general has reconquered Sudan? 592.
When was Sudan declared open for general traffic? 1843.

BABYLONIA.

- What made Babylon the most fertile spot in Asia? 152.
What did the Babylonians know of irrigation? 940.
How have we gained our knowledge of ancient Babylon? 152.
When did boys become free citizens? 152.
What privileges did women enjoy? 152.
How far back does Babylonian history go? 152.
When did Babylon become the capital of the empire? 152.
Who was one of the greatest of ancient monarchs? 1315.
What people did he carry into captivity? 153.
Why did the people revolt against Nabunaid? 153.
When and by whom was Babylon captured? 153.
How has Babylon been successively ruled? 153.
How was the city of Babylon built? 152.
What is the finest work in Babylonian literature? 1080.

ASSYRIA.

- How did we learn the history of Assyria? 1352.
What description does Jonah give of the city of Ninevah? 1352.
Who was the real founder of the first Assyrian Empire? 125.
When did the empire decay? 125.
What king again established the power of Assyria? 125.
Who usurped the throne and what tax did he levy? 126.
Who carried away 27,000 of the best citizens of Samaria? 126.
Who was Assyria's greatest king? 126.
How is Sennacherib mentioned in the Bible? 126.
When did the kingdom reach its greatest height? 126.
What present town is near the ruins of Ninevah? 126.
From what place have many Babylonian records been shipped? 126.

HISTORY

What was the development of art in Assyria, Babylonia and Chaldea? 668.

Why were Assyrian boys educated at home? 1081.

THE HEBREWS.

How long have the Hebrews been called Jews? 971.

Where did the Hebrews first settle? 971.

How long did they remain in Egypt? 971.

When did Moses lead them out of Egypt? 971.

Under what leader did they enter the land of promise? 971.

How was the tribe of Levi provided for? 971.

What is the heroic age of Hebrew history? 972.

Who were the greatest of the 15 judges? 972.

Who were the greatest Hebrew kings? 972.

Who founded the lyric poetry of the Hebrews? 507.

What madness seized Saul? 1683.

Why was Solomon's reign a splendid failure? 972.

Who were the Samaritans? 972.

How long did the exile of the Jews last? 972.

What heroic family drove out the Syrians? 972.

What Roman captured Jerusalem? 972.

When did the Jews get the rights of Roman citizens? 972.

When was the temple at Jerusalem destroyed? 972.

What has been the history of the Jews since their dispersion? 973.

How are the Jews now distributed throughout the world? 973.

Who is placed next to Moses in Jewish literature? 1081.

Name some noted Jews in literature, science and public life? 1082.

How did the Jews divide the Scriptures? 209.

What saved the life of Josephus the Jewish historian? 979.

THE PHOENICIANS.

What was the extent of Phœnicia? 1473.

Where did the Phœnician settlers come from? 1722.

When did Sidon begin to take the lead? 1473.

Under what people did Sidon reach its greatest prosperity? 1753.

What did Hiram, king of Tyre, furnish to Solomon? 1963.

What colonies were founded by the Phœnicians? 342, 1473.

What is the origin of the English alphabet? 1722.

What were the two chief manufactures of Phœnicia? 773, 1473.

What did the Phœnicians know of mining and working metals? 1473.

What is the last period of Phœnician history? 1473.

What was the religion of the Phœnicians? 1473.

When did the last shadow of Phœnician independence pass away? 1473.

GREECE.

From what people did the ancient Greeks come? 801.

What were their character and occupation? 801.

How did they enter Greece? 801.

What did each succeeding tribe do to the ones that went before them? 801.

When did the Greeks found cities in Sicily? 1751.

What was the early form of government in Syracuse? 1861.

Where is Sparta located? 1792.

How were the citizens classed? 1792.

What did Lycurgus do for Sparta? 1792.

In whose honor was Athens named? 180.

How is Draco unjustly blamed? 548.

What did Solon make the title to citizenship? 1779.

What was Solon's purpose in doing this? 1779.

What was the ceremony of giving an oracle? 518.

Where were the Pythian games held? 1568.

When were the Olympic games abolished? 1381.

What Persian king made the first two wars against Greece? 504.

- What was one of the decisive battles of the world? 1167.
 What Persian king made the third expedition against Greece? 2118.
 Who was one of the ten generals chosen to resist the Persian invasion of Attica? 1228.
 How many men escaped from the battle of Thermopylæ? 1901.
 Who led the fight at the pass? 1056.
 How did Themistocles win the battle of Salamis? 1664.
 What rival helped him to win this battle? 97.
 What other contest took place on the same day? 343.
 Why was Themistocles banished? 1899.
 Where was Mardonius, the Persian, defeated? 1502.
 When was the most brilliant epoch of Athens? 130.
 What made the age of Pericles glorious? 130.
 What was the dying statement of Pericles? 1453.
 What caused the Peloponnesian War? 1453.
 What people incited this war? 455.
 When was the Confederacy of Delos formed? 518.
 What is the earliest Greek literature we have? 1082.
 What closes classical Greek literature? 1082.
 What work of art illustrates a thousand years of Grecian history? 669.
 What ruined the Parthenon? 1426.
 Who built the Propylæa? 1465.
 Where and when was Herodotus born? 868.
 How did Socrates teach? 1777.
 Why did he marry Xantippe the famous scold? 1777.
 Why did Plato abandon poetry? 1502.
 What are the important works of Aristotle? 97.
 How did the drama arise in Greece? 550.
 What are the seven tragedies of Æschylus? 21.
 Who won the prize long held by Æschylus? 1781.
 What happened in Athens when Euripides died? 632.
 What heroic resistance did Plataea make to Sparta? 1501.
 Who was the first king of Macedon? 1135.
 Who was the father of Alexander the Great? 1135.
 At what age did Alexander take charge of his father's government? 44.
 What did Demosthenes do to stop the Macedonian conquest? 1899.
 How did Alexander avenge himself upon the citizens of Thebes? 1899.
 In what great battle did he defeat the Persians? 44.
 What were the conditions of surrender made by Alexander to Darius? 44.
 What disaster to Persia followed the battle of Arbela? 44.
 Who did Alexander say should inherit his throne? 44.
 When did the magnificent city of Persepolis disappear from history? 1455.
 In what year did Greece become a Roman province? 1135.
 What horde of barbarians ravaged Greece in 395 A.D.? 801.
 Who defeated the Bulgarians? 801.
 When did Greece pass into the hands of the Turks? 801.
 When did the war of independence break out in Greece? 801.
 What famous English poet fought with the Greeks in this war? 298.
 Who was elected king of the Hellenes in 1863? 801.
 Are the modern inhabitants of Greece descended from the ancient Greeks? 801.

ROME.

- What is the legendary history of Romulus? 1631.
 What peoples were mingled to form the ancient Romans? 1626.
 What is the most rational view regarding the founding of Rome? 1626.
 What crime led to the founding of the republic? 1872.
 How have we learned the history of the Etruscans? 630.
 Who made Rome the acknowledged head of Latium? 1872.

- How did the Romans get Sabine wives? 1651.
 What final victory placed Rome in control of all Italy? 1627.
 When was Etruria admitted finally to the Roman empire? 630.
 What were the Punic wars and when did each break out? 1562.
 What did Rome gain by the first Punic war? 343.
 How many years did Hamilcar defy Rome? 830.
 What famous Carthaginian general fought during the second Punic war? 834.
 What terrible punishment was visited upon Carthage at the end of the third Punic war? 1707.
 What was the last battle Rome had with a civilized people? 1627.
 Who was Jugurtha (1365), and what general finished the war with him? 1172.
 In what city was the insurrection of slaves organized? 331.
 What famous slave raised an army of 100,000 men to fight Rome? 1792.
 What ended the servile war? 1525.
 How did the plebeians wrest the tribuneship from the patricians? 1941.
 Who let loose 4,000 slaves to kill the aristocrats of Rome? 1172.
 How did Sulla get rid of his enemies? 1845.
 What was the proud boast of Cornelia, the Roman matron? 789.
 At what famous battle was Pompey entirely overthrown? 303.
 How did Cæsar feel over Pompey's death? 1525.
 From what city did he send his famous message: "I came, I saw, I conquered"? 2031.
 Where does the modern title of Emperor come from? 303.
 What month was named in honor of Cæsar? 303.
 What celebrated battle made Augustus master of the Roman world? 138.
 Why did the beautiful queen Cleopatra commit suicide? 409.
 What was the extent of the Roman empire at the death of Augustus? 1627.
 Who was the first emperor to lead the Roman legions in person? 1934.
 What emperor made a tour of the empire on foot to learn the needs of the provinces? 822.
 Who was the saintliest of pagans? 139.
 What new form of government did Diocletian give Rome? 533.
 How did the cross come to be the standard of the Roman soldiers? 447.
 Does Constantine's system of government exist anywhere today? 447.
 With what power did he endow Christianity? 447.
 What great general overthrew the Vandals? 2002.
 What was the end of the Roman empire? 1627.

EUROPE.

- What name is given to all ancient German races? 1895.
 What barbaric women killed themselves and their children at the battle of Verona? 399.
 Who were the Ostrogoths and the Visigoths? 784.
 What misfortune befell Rome by the putting to death of Stilicho? 37.
 What saved Europe from the Huns? 785.
 What were the character and manner of living of the Huns? 899.
 What remarkable meeting took place between Pope Leo and Attila? 899.
 How were the Goths converted to Christianity? 785.
 What is the value of Gothic in the study of Teutonic languages? 785.
 What important part in history is played by the monks of the middle ages? 1250.
 What was then the most important body of monks? 1250.
 What work was done by the Benedictine monks for literature? 1063.
 How did King Clovis become a Christian? 413.
 What monks brought Christianity into England? 616.
 What pope established our present calendar? 307.
 What English priest became the Apostle of Germany? 242

- What religious order produced some of the greatest preachers and teachers of the middle ages? 543.
- What was the famous contest of investiture between Hildebrand and Henry IV? 804, 326, 812.
- What pope established Ash Wednesday observance? 119.
- To whom is the Catholic Church indebted for her ritual and chants? 804.
- Who first made the pope a temporal sovereign? 1450.
- When was the temporal power of the pope formally established? 1054.
- What were the ecumenical councils? 396.
- Who were the Black Friars of England? 543.
- Who Christianized the Saxon people? 368.
- What emperor set up schools throughout his country in the ninth century? 368.
- What people harassed England during the time of Alfred the Great? 48, 616.
- When did the Northmen first attack England? 1359.
- Who was the most illustrious of the Normans? 1360.
- Who was absolute owner of all the land under the feudal system? 658.
- How were the kings of Europe supported under the feudal system? 1875.
- Under whose dominion was the Holy Roman Empire? 634.
- Over what provinces did Henry II of Anjou reign? 634.
- Where were the Hungarians located? 634.
- How was half the population of Europe destroyed in 1348? 1499.
- Whose reign was known as the golden age of Portugal? 610.
- When did Portugal rank as one of the greatest monarchies of Europe? 1534.
- At the beginning of the sixteenth century what was the extent of the empire ruled by Charles V? 634.
- Who delivered Holland from the Spanish yoke? 879.
- When did the Thirty Years' War occur? 634.
- In what century was Sweden a great power? 634.
- When did Russia begin to make a steady growth? 634.
- At what time was Poland one of the most powerful states in Europe? 634.
- When did the duchy of Prussia become independent of Poland? 634.
- When did Russia begin to make a steady growth? 634.
- When did the French Revolution occur, and how did it affect the map of Europe? 634.
- After the fall of Napoleon's empire, how were the portions of Europe governed which now comprise Italy, Holland, Belgium, Germany and France? 634.
- What are the chief changes in Europe since the middle of the nineteenth century? 635.
- The early history of Europe is that of what three great empires? 633.
- What barbaric people were next to the Western Empire? 634.
- What people were next to the Eastern Empire? 634.
- How were the German barbarians divided? 634.
- Where was the home of the Slavs? 634.
- Where were the Gothic tribes found? 634.
- What people entered Britain when abandoned by the Roman garrisons? 634.
- What became the starting point of the kingdoms of France and of Germany? 634.
- What great empire began near the close of the eighth century? 634.
- What important victory had much to do in keeping Europe from becoming a Mohammedan country? 371.
- When did the Mohammedans establish themselves in Spain? 634.
- In what century was the Holy Roman Empire established? 634.

- Who was the first Roman to sail around England, proving it to be an island? 26.
- Almost every country of Europe was brought under the power of which pope? 927.
- Where is Thermopylæ Pass, and what made it famous? 1901.
- What was the Augustan age? 137.
- To what power does Iceland belong? 911.
- For what is the Dardanelles celebrated in ancient history? 503.
- What territory does the Ottoman Empire comprise? 1955.
- When did Servia first lose her independence, and when last gain it? 1726.
- What queen conquered Sweden, Lapland and Finland, and was afterwards called the Semiramis of the North? 1170.
- What victory of the eighteenth century prevented the invasion of England by the French? 1663.
- Who were the Turanians? 1952.
- What Albanian chief with fifteen thousand men defied the Sultan, who had an army of one hundred and fifty thousand? 1687.
- What caused Napoleon's defeat at Waterloo? 1301.
- What empire was much reduced in territory by the Treaty of Berlin? 205.
- What battle prevented the inferior nations of the East from destroying the civilization of the West? 135.
- When and where was the last battle fought by the Goths? 785.
- How long did the age of chivalry last? 1008.
- What was the condition of knighthood under the feudal system? 1007.
- What was the badge and what was the war-cry of the Crusaders? 483.
- What became of the children of the Children's Crusade? 483.
- Where is the oldest cathedral in Normandy? 184.
- What church did St. Augustine consecrate in England? 326.
- What is one of the finest specimens of Gothic architecture in Europe? 425.
- What church was built to enshrine the bones of St. Cuthbert? 563.
- What cathedral offers examples of all styles of Gothic architecture? 610.
- Where is the Augustinian monastery which once was the home of Martin Luther? 623.
- What dome served as a model for St. Peter's? 683.
- Where is the famous bell Great Peter? 774.
- What cathedral, begun in 1386, was finished by order of Napoleon? 1223.
- Where is one of the great towers of Italy? 1245.
- Where are the two cathedrals of Notre Dame in France? 1422, 149.
- How high is the belfry tower of St. Bavon's cathedral in Ghent? 763.
- What cathedral has a cedar crucifix dating from A. D. 782? 1122.
- How far back do the annals of Westminster Abbey go? 1111.
- What is one of the finest Byzantine churches from the period of Constantine? 93, 447.
- What is the highest church-spire in England? 1665.
- Where is a son of Columbus buried? 1729.
- What is one of the finest Gothic churches in Italy? 1753.

FRANCE.

- Do the French emigrate largely? 706.
- Who was the earliest historian of France? 704.
- What was it called by that writer? 704.
- What was its condition when invaded by Cæsar? 704.
- What people succeeded the Romans in power? 704.
- What dynasty did Clovis found? 704.
- Who founded the Carlovingian dynasty? 704.
- Who was the real founder of the French monarchy? 704.
- What caused the enmity between France and England? 704.
- What was the Seventy Years' Captivity? 1467.

- What was the Salic Law? 704.
 What great battle was fought at Crécy? 476. At Poitiers? 1512. At Agincourt? 26.
 During what period did the Valois monarchs occupy the throne? 2000.
 What king was called the father of his people? 704.
 Under what king did the house of Guise become powerful? 704.
 What effect did the massacre of St. Bartholomew have upon the country? 704.
 Who was the first of the Bourbon princes? 704.
 What king first lived in the palace of the Tuileries? 1949.
 Who caused the overthrow of the Huguenot party as a political power? 1612.
 In whose reign did France reach its highest point of luxury and power? 704.
 What did Colbert do for France? 420.
 Who were the two greatest generals during the civil wars? 1953.
 What wars were closed by the Treaty of Ryswick? 1650.
 What effect had the revocation of the Edict of Nantes? 704.
 Who abolished the compulsory labor of the poor on the public roads? 1954.
 When did the French Revolution break out? 704.
 What occasioned it? 717.
 What was the character of Louis XVI.? 717.
 When was the Bastille taken? 717.
 Who were the Girondists? 717.
 Who were the Montagnards? 717.
 What was the Jacobin Club? 955.
 Who led in the Reign of Terror? 717.
 What was the Commune of Paris? 434.
 What was the Directory? 533.
 When did Napoleon become consul of France? 278.
 What victory did Napoleon win at Marengo? 1169.
 When and by what means was Napoleon declared emperor? 705.
 How did Napoleon change the map of Europe? 705.
 When and where did Napoleon sign his act of abdication? 689.
 What general indirectly caused Napoleon's defeat at Waterloo? 807.
 Who was the last of the French kings? 705.
 Who was the first president of the new republic? 705.
 How did Napoleon III become emperor? 705.
 Who attempted to assassinate Napoleon III? 1395.
 Who was the first president of the republic after the Franco-German war? 705.
 Who succeeded Thiers as president? 1140.

GERMAN EMPIRE.

- What skillful leader did much to increase the power and influence of the empire? 759.
 By what emperor was Prince Bismarck deposed from the position of chancellor? 759.
 When was the first university founded in Germany? 760.
 How are the universities controlled? 760.
 What is Walpurgis Night, and what caused its origin in Germany? 2038.
 When do the Germans first appear in history? 758.
 What was their condition at the time of meeting the Roman armies? 758.
 What was the origin of the Goths, Franks and Saxons? 758.
 After the breaking up of the Roman Empire what kingdoms were formed by the Franks? 758.
 What noted person was the first of a succession of rulers that lasted over a thousand years? 758.
 How many nations were there in Germany at the time of Charlemagne's death? 758.

- How did Henry III strengthen the empire? 758.
 When did the famous Frederick I reign? 758.
 How did the great monarch Frederick I. spend most of his time? 758.
 During the reign of Maximilian I what great reformer began preaching? 758.
 How did the Peasants' War and the Thirty Years' War affect the rural parts of Germany? 758.
 In 1702-13 what war brought glory to the German arms but was of no advantage to the country? 759.
 When did Frederick the Great come into prominence? 759.
 What was the condition of Germany during the time of Napoleon's power in Europe? 759.
 What combination did the free German states make after the fall of Napoleon? 759.
 What war occurred in 1866 for the leadership in Germany? 759.
 What part did the southern German states take in the war between France and Prussia? 759.
 What was the most important result of this war? 759.

HOLLAND.

- When did the Frisians occupy what is now Holland? 879.
 In the eighth century they submitted to what ruler? 879.
 What Spanish ruler made the Netherlands a country of great importance? 879.
 Who delivered the Dutch from the Spanish yoke? 879.
 In what century was Holland one of the great powers of Europe? 879.
 By what country was her power crippled in the naval war of 1652-54? 879.
 What did William III of England do for Holland? 879.
 What century marks Holland's decay? 879.
 Who was made king of Holland in 1806? 879.
 When was Holland added to the French empire? 879.
 After the fall of Napoleon what kingdom was formed? 879.
 When did Belgium secede? 879.

ITALY.

- Who was crowned king of Italy and emperor of Rome in 961 A. D.? 947.
 For how many years did the crown of Italy belong to the kingship of Germany? 947.
 What was the condition of the Italian kingdom while its foreign emperors were living beyond the Alps? 947.
 To what did Emperor Frederick Barbarossa agree in 1177? 947.
 How was Italy divided in the fourteenth and fifteenth centuries? 948.
 What century was the most disastrous in Italian history? 948.
 In the sixteenth century how was the papacy strengthened? 948.
 When did Napoleon conquer Italy? 948.
 What did the Congress of Vienna do for Italy in 1815? 948.
 Who were the leaders in the rebellion of 1848? 948.
 When did the emancipation of Italy become complete? 948.
 What did the pope retain? 948.
 When was King Humbert assassinated? 948.
 Who is the present ruler of Italy? 948.

SWITZERLAND.

- What is said of the first inhabitants of Switzerland? 1858.
 When was Christianity adopted? 1858.
 Of what empire was Switzerland formerly a part? 1858.
 What caused the men of the forest cantons to begin war against Austria? 1858.
 What famous battle ended the Swiss struggles with Austria? 1858.
 By what means was other territory won by Switzerland? 1858.
 How did Zurich become a Protestant city? 1858.

Against whom was a religious war waged? 1858.
 Who was successful in this war? 1858.
 In what treaty did the European powers acknowledge the independence of Switzerland? 1858.
 By whom was Switzerland seized in 1798? 1858.
 When did it recover its freedom? 1858.
 What have the various cantons attempted to regain since they recovered their freedom from France? 1858.
 Who were the Free Corps? 1413. What was their purpose? 1413.
 What league did the Catholic cantons form? 1858.
 By whom was a successful war waged against the Catholic cantons? 1858.
 When was the present constitution chosen? 1858.

SPAIN.

Of what race do the Spanish nobles claim to be descendants? 785.
 What has made Seville one of the country's most famous cities? 1729.
 During what siege did women and children throw themselves into the fire while the men fought? 1654.
 What is the condition of the Alhambra to-day? 50.
 Who were the earliest visitors to Spain? 1788.
 What people made the first effort to occupy the country? 1788.
 What people were expelled by the Romans? 1788.
 When was the Roman conquest of the peninsula completed? 1788.
 By what name was Spain known to the Romans? 1788.
 When did Spain become the seat of a Gothic kingdom? 1788.
 How long did the Moorish kingdom in Spain last? 1788.
 When did it reach its highest prosperity? 1788.
 Who was the most powerful ruler? 1789.
 How were the different provinces united? 1789.
 What discovery raised Spain to a high place among European nations? 1789.
 How did Philip II become king of the country? 1467.
 How did he exhaust the strength of the country? 1789.
 For what purpose did he organize "the invincible Armada"? 1467.
 Under whose leadership was the Union of Utrecht formed? 1467.
 What part did Spain take in the Thirty Years' War, and with what result? 1789.
 Who was the first Bourbon king of Spain? 1789.
 What queen whom Carlyle called the termagant disturbed the peace of Europe for thirty years? 1469.
 What king did the people of the country refuse to recognize in 1808? 1789.
 What great naval battle was fought at Trafalgar? 1934.
 Who is the present king of Spain? 1789.
 What led to the Spanish-American war, and what was the result of this war? 1789.

SCANDINAVIA.

How far back does the history of Denmark go? 520
 What country did Waldemar I conquer? 521.
 What was the character of Queen Margaret's rule? 521.
 How was Christian I chosen king? 521.
 Under whose rule was Sweden separated from Denmark? 521.
 When was Norway lost to Denmark? 521. To Sweden? 1855.
 With what other people is the history of this country associated? 1361.
 When was Norway attached to Sweden? 1361.
 When were titles of nobility abolished? 1361.
 Who is said to have first conquered the whole of Sweden? 1854.
 What were the Swedes in general doing at the time their history begins? 1854.
 Who was the first Christian king, and when was he baptized? 1854.
 When and under what ruler were the three Scandinavian countries united? 1854.

How did the great general, Gustavus Adolphus, spend the greater part of his reign? 1854.
What acknowledgement did Charles XI win from the diet? 1855.
How did Charles XII make his power felt in Europe, and what was the effect in his own country? 1855.
What acknowledgment did Charles XI win from the diet? 1855.
Who was Charles XIV? 1855.
What is the most celebrated cathedral in Sweden? 1991.
What is known as the blood-bath of Stockholm? 1828.

RUSSIA.

From what direction did the Russian Slavs enter Russia? 1647.
When was the first written law compiled? 1647.
What kind of government was established in the towns and colonies founded as the Slavs steadily moved eastward? 1647.
What did Prince Andrei Bogalubski do? 1647.
What people conquered the Russians in 1224? 1647.
What effect did the Mongol conquest have upon the civilization of the country? 1647.
When did Russia first try to throw off the Mongol yoke? 1647-8.
What Russian prince succeeded in defeating the Mongols and freeing Russia? 1648.
Who was the first to take the title of tsar? 1648.
What order of Regent Boris Godunoff sowed the seed of serfdom? 1648.
Under Alexis, the Russians gained the upper hand of what rival power? 1648.
What improvements did Peter the Great make? 1648.
What officers were the real rulers under Catherine I and Peter II? 1648.
Under whose reign occurred the first partition of Poland and the widening of Russia's domain? 1648.
Under whose reign was Russia invaded by the French and the city of Moscow burned? 1648.
What did Alexander II do for the serfs? 1648.
Have the mines of Siberia been developed? 1750.
What name was given to the earliest inhabitants? 1750.
What people conquered the country in the eleventh century? 1750.
What class of Russians were the first to invade Siberia? 1750.
When was Russian possession of Siberia acknowledged by China? 1750.
When does the history of Poland begin? 1513.
From the reign of Mieczyslaw, how long did Poland continue as an independent power? 1513.
When did the first partition of Poland take place? 1513.
What countries combined for the dismemberment of Poland? 1513.
Where was Kosciusko defeated and made a prisoner? 1513.
What were the conditions that led to the downfall of Poland? 1513.
What action was taken against the Jews by Alexander III? 1648.
Of recent years does Russia seem to be progressing? 1648.

TURKEY.

Of what empire is the Ottoman Empire the successor? 483.
Who was its founder? 483.
What sultan conquered Constantinople and when? 1956.
What sultan raised Turkey to its highest military power? 1956.
Who was called the Magnificent? 1956.
What was the result of the battle of Lepanto? 1056.
What generals reduced the Turkish power in Europe? 1956.
What general conquered Egypt? 1956.
Who were the janizaries? 960.
How did Mahmud II rid his empire of them? 960.
What troops have taken their place? 960.

What was the result of the battle of Navarino? 1956.
 In what year did Greece become independent? 1956.
 When was Turkey admitted into the political system of European states? 1956.
 What caused the Russo-Turkish war? 1956, 1957.
 How did this war change the map of European Turkey? 1957.
 What was the cause of the Armenian massacres? 1957.
 When did they occur? 1957.
 What was the extent of their design and how far was this accomplished? 1957.
 What is the largest city? 1957.
 What city contained three thousand statues, including the wonderful Helios? 1607.

JAPAN.

Who is the Japanese Bismarck? 960.
 How many small islands in Japan? 961.
 What is the population of Japan? 961.
 What kinds of wood are grown in Japan? 961.
 What makes the coast look like a Japanese screen? 961.
 What is the character of a large percentage of the country? 961.
 Do Japanese babies cry? 961.
 How do the Japanese dress? 961.
 What are the houses built of? 961.
 What gives Japan a holiday air? 961.
 What happens at cherry-blossom time in April? 962.
 What are the two religions of Japan? 962.
 When did St. Francis Xavier introduce Christianity. 962.
 When did true historic records begin to be kept? 962.
 What made Japan a hermit empire? 962.
 When did the Dutch and Portuguese trade with Nagasaki? 962.
 What did Commodore Perry demand in 1854? 962.
 What singular distinction belongs to Mutsuhito? 1292.
 Who told the powers they had been hoaxed? 962, 1293.
 What dramatic changes mark the seven decades of Mutsuhito's life? 1293.
 What is the Era of Enlightened Peace? 963.
 What did the daring young nobles do in the 50's? 963.
 How did the boy-emperor instruct the Japanese representatives? 963
 What are the five orders of the new nobility? 963.
 After what model was the army organized? 963.
 What countries were imitated in the navy? 963.
 What countries furnished the pattern for the constitution? 963.
 When was Port Arthur fired on? 964.
 Where was the first great modern naval battle? 964.
 Who helped to end the Russo-Japan war? 964.
 How big is Tokyo? 964.
 What trouble arose in San Francisco in 1906? 964.
 What arts are declining in Japan? 965.

CHINESE EMPIRE.

How many years back do the annals of China extend? 390.
 China as an empire dates from what year? 390.
 In what year did the present dynasty begin to reign? 390.
 What two personages are always found in China, no matter how far back you go? 390.
 Whose death in 1405 saved the independence of China? 1914.
 From what has the custom grown, since the seventh century, that all officers of the government must be educated? 390.
 What are the three religions of China? 390-1.
 What is the characteristic of each religion? 390.
 Of what does the government power of the empire consist? 391.
 At what hour of the day does the Grand Cabinet meet? 391.

In what year did European nations begin to trade with China? 391.
 What caused the war with England in 1840? 391.
 When and by whom was the first treaty made between China and the United States? 391.
 When did the present emperor come to the throne? 391.
 What was the cause of the war with Japan in 1894? 391.
 What was the result of the war with Japan in regard to Chinese territory? 391.
 When did the Boxer rising occur? 254.
 Who was the instigator of the Boxer rising? 254.
 How long were the foreign legations besieged in Peking? 264.
 The representatives of what foreign nations were murdered? 264
 How many persons were killed in defending the legations? 264.
 What indemnity was demanded of China by the foreign nations? 264.

GREAT BRITAIN AND IRELAND.

Did the cave-men own domestic animals? 353.
 Where did the Celts first make their home? 520.
 Why are the Celts said to be one of the oldest distinct races in the world? 116.
 What was the nature of these primitive people? 116.
 What are the purely Celtic people? 357.
 Did these ancient people believe in God and a future life? 554.
 What were their bards, prophets and priests called? 554.
 What was the most numerous and powerful of the British tribes? 2123.
 What is one of the most ancient of British cities? 2123.
 Who was the first Roman to invade Britain? 303.
 Did the Romans conquer Wales? 2034.
 What Roman general spent seven years conquering the island? 26.
 What "warrior queen" slew 70,000 Roman soldiers for injuring her people? 232.
 What Roman emperor died in England? 2123.
 What three tribes conquered Britain after the Romans left? 73.
 Why was Britain called England? 73.
 What is the meaning of Heptarchy? 73.
 Is the English language like the Anglo-Saxon tongue? 1088, 73.
 What terrible foes were driven from Wessex by Alfred the Great? 48.
 How did he spend the years of peace that followed? 48.
 How did the Danish king Canute get possession of England? 583.
 What was the noble character of Canute? 328.
 What religious difference was there between Canute and his grandfather? 521.
 From what countries came the Celts, Angles, Saxons, Jutes, Danes and Normans? 520, 1687.
 What marriage led to the introduction of Christianity? 616.
 What monk made King Edgar's reign the most prosperous in early history? 562.
 What great Englishman helped Edward the Confessor to restore the Saxon line? 776.
 When was the battle of Hastings fought? 2085.
 What has the battlefield been called ever since? 847.
 When was feudalism brought into England? 616.
 Why did William the Conqueror invade England? 2085.
 How did he avenge a sarcastic remark about his fatness? 2086.
 How did William meet his death? 2086.
 What price did William Rufus pay for Normandy? 2086.
 Which of the Conqueror's sons was known as the Lion of Justice? 862.
 Which one was a crusader? 483.
 What was the condition of a serf? 1765.
 What form of serfdom remained in Scotland until about 1800? 1766.
 What ancient people played the bagpipe? 157.
 Who was the wife of Geoffrey Plantagenet? 862

- Name the Plantagenet kings? 1501.
 What angry remark led to the death of Thomas à Becket? 189.
 What were the Constitutions of Clarendon? 189.
 How did Richard the Lion-Heart spend the greater part of his reign? 1610.
 How was King John Lackland disgraced? 616.
 How were the Englishmen benefited by the Magna Charta? 1145.
 Whom do the English people call St. Simon? 1257.
 What king is known as the English Justinian? 586.
 When were all Jews driven from England? 586.
 Upon what great principle of justice was the House of Parliament founded? 616.
 What did Edward I do for John Balliol, the Scotch king? 586.
 What king was cast into prison by his wife? 586.
 Who led the Scots in the historic battle of Bannockburn? 586.
 What relic of this battle is shown today in Scotland? 170.
 What king was for many years an outlaw in his own kingdom? 278.
 What war helped to free the lowest orders from serfdom (616) and permanently changed the relations of master and laborer? 587.
 Did the famous Black Prince ever become king of England? 587.
 When were cannon first used by the English? 476.
 Why did Edward II send his uncle on a wild expedition into Spain? 974.
 What happened to Richard II upon his return from an expedition to Ireland? 1611.
 What put an end to the Wars of the Roses? 249, 587.
 What great queen spent 20 years in war and 4 in prison? 1170.
 How did Edward IV get the money he needed? 587.
 How did Richard III suffer for his numerous crimes? 1611.
 What brewer became the father of a line of English kings? 1949.
 How did the first Tudor king reunite the red and white Roses? 863.
 What admirable qualities had Henry VIII during the first half of his reign? 863.
 Who was Catherine of Aragon? 350.
 What honorable title was bestowed on Henry VIII by Pope Leo X? 863.
 What suggestion did Cranmer make to ease the mind of Henry VIII? 474.
 What ruined the reign of Mary Tudor? 1180.
 Who is called the Morning-Star of the Reformation? 2114.
 When did England become a world power? 607.
 What was the dismal end of the Spanish Armada? 103.
 What are the great blots on the reign of Queen Elizabeth? 607.
 What right had Mary Queen of Scots to the throne of Elizabeth? 1181.
 What great poet made the reign of Elizabeth illustrious for all time? 1089.
 When did Parliament allow English to be spoken in the law-courts? 618.
 Who was called the wisest fool in Christendom? 957.
 What caused the struggle between Parliament and Charles I? 368.
 What did the nicknames Roundhead and Cavalier mean? 353.
 Did Cromwell's government benefit the people of England? 481.
 How did Cromwell treat the Irish? 937.
 When was Cromwell made Protector? 171.
 Why is William III called the first parliamentary king? 617.
 When did the present reigning dynasty of England come to the throne? 617.
 When was the society of Orangemen formed? 1388.
 When were the king and queen of England both crowned sovereigns? 2086.
 What celebrated queen was the mother of 17 children? 75.
 Who are the peers of England? 1424.
 When was Sir Robert Walpole actual ruler of England? 2038, 751.
 Describe the South-Sea Bubble. 1787.

- Who is the prime minister of England? 300.
 What eminent statesman was prime minister to George III? 751.
 What caused him to lose the American colonies? 751.
 When did the British East India Company settle in India? 920.
 What victory fastened England's rule upon Bengal? 411.
 When were the exclusive privileges taken away from the East India Company? 576.
 What famous trial of seven years was held over East Indian affairs? 847.
 How did the Seven Years' War affect the American colonies? 1727.
 What famous general was known as the Iron Duke? 2067.
 When was the 3rd of Sept. changed to the 14th, to the consternation of ignorant people? 307.
 What was the Manchester Anti-Cornlaw League? 416.
 Why was Victoria the most constitutional monarch of England? 2019.
 What did the great reform-bill do for the English people? 617.
 What brought an end to the Crimean War? 478, 1716.
 When did the Indian Mutiny occur? 354.
 What famous general was born at Cawnpore? 1619.
 How did Queen Victoria become endeared to the American people? 2019.
 What war cost England \$937,000,000 in four years? 235.
 What immense service did "Little Bobs" render his country? 1619.

AMERICA.

- Who recommended Columbus to Queen Isabella? 431.
 Which of the West Indies is said to have been first discovered? 157, 2070.
 How is the Duke of Veragua related to Columbus? 431.
 Was Columbus the first to believe that the earth is a sphere? 745.
 What famous maker of maps first showed that America is a new continent? 301.
 What did the Filipinos do to Magellan on the first voyage around the globe? 1144.
 What letter to a school-friend caused America to be named? 2016.
 Did the man who discovered the Pacific name it? 1407.
 Where did the American Indians come from? 60, 921.

MEXICO.

- When did the Toltecs come to Mexico? 1216.
 Who invented the Mexican calendar? 1216.
 Who was Aztlan? 150.
 What broke the heart of the last Aztec emperor? 1257.
 How were the Aztec women educated? 150.
 Where are some Aztecs living today? 1668.
 Where did Cortes burn his ships? 462.
 Was Cortes a common adventurer? 462.
 What is one of the romances of history? 1216.
 How are the records of the Aztecs preserved? 150.
 How did the Spaniards treat the native Mexicans? 1216.
 What did New Spain include? 1216.
 How did the priest Hidalgo serve his countrymen? 1216.
 Who established the Mexican republic? 1216.
 Under what incompetent monarch did Spain lose Mexico? 656.
 What is the character of Emperor Augustine I? 949.
 What relation had the Mexican states to the central government? 1675.
 Under what president was war again declared? 1216.
 Where did Maximilian make his last stand? 1574.
 How did he directly cause his own death? 1192.
 What was the pathetic fate of his loyal queen? 1192.
 What faithful general was executed with him? 1239.
 Who is the ablest of Mexican rulers? 1216.

Of what nationality is the higher class? 1216.
 What man's life offers no parallel in history? 528.
 At what age did Diaz walk 250 miles to enlist? 528.
 Why is Diaz called the perpetual president? 528.
 What is the salary of Diaz? 529.
 Where is his home? 367.
 What great emperor is compared with Diaz? 529.
 What were the parents of President Juarez? 981.
 When did he take over the government? 981.
 When was his government recognized by the United States? 981.
 When did Santa Anna become president? 1675.
 In what army did he serve against his country? 1675.
 How did he cause the loss of Texas? 1675.
 What battle did he lose to Gen. Sam Houston? 1673.
 When was he told to leave the country? 1675.
 What is one of the most prosperous manufacturing towns in Mexico?
 1256.
 What did Las Casas do for the native Indians? 344.
 What people founded the City of Mexico? 1213.
 What lineal descendant of the ancient emperors wrote a complete
 history of Mexico? 951.
 What is the holiest shrine in Mexico? 1214.

CANADA.

Who visited Newfoundland five years after Columbus discovered
 America? 1341.
 How did the West-of-England fishermen conceal their profitable
 voyages? 1341.
 What character had the Newfoundland colonists? 1341.
 What brilliant English victory of the Seven Years' War was gained
 here? 1341.
 When was the first civil governor appointed? 1341.
 What remarkable resemblance does Newfoundland bear to the British
 Isles? 1342.
 How did the first railroad benefit Newfoundland? 1341.
 From what part of England did the early settlers come? 268.
 Is Newfoundland a part of the Dominion of Canada? 269, 320.
 Who discovered the mainland of Canada? 343.
 What name did the French give to Nova Scotia? 6.
 What part of the population is Acadian? 6.
 What splendid schools and colleges flourish in Nova Scotia? 1363.
 What great king reigned in England when Nova Scotia was discovered?
 319, 863.
 Why did the Indians call Halifax Chebucto? 827.
 In what famous treaty was Nova Scotia acknowledged to be British
 territory? 319.
 Tell some interesting facts about that famous Englishman who founded
 the Hudson Bay Company. 1644.
 What was the extent of its territory? 893.
 Who was the last resident governor of the Hudson Bay Company?
 1836.
 What was the first white settlement in Manitoba? 1159.
 From what country did these settlers come? 1159.
 When did Manitoba become part of the Canadian federation? 1159.
 Near what fort did the village of Winnipeg grow up? 2095.
 What has made Alberta famous? 307.
 What caused the Red River Rebellion? 1596.
 What was the fate of the leader? 1613.
 What archbishop induced the rebels to lay down their arms? 1596.
 Who commanded the Red River expedition? 2103.
 What foolish act of a mob gave Willian Lyon MacKenzie increased
 influence? 1138.

- Who was the only Canadian refugee to whom an amnesty was refused for rebellion? 563, 1138.
- What caused the rebellion of 1837? 1385.
- What Canadian premier took part in this rebellion? 343.
- What has caused the mistaken impression of Canadian climate held by Europeans? 1966.
- What name did Cartier give to the Indian village of Hochelaga? 343.
- What is the commercial metropolis of all British America? 1285.
- Where did the French missionaries and traders start from on their daring expeditions? 1572.
- What are some points of interest in the most historic city of Canada? 1573.
- How did France lose Canada? 1117.
- What great war led to the Treaty of Paris? 1728.
- What struggle increased the British possessions in America twenty-fold? 716.
- How did George Washington help England to gain Canada? 714.
- What great Canadian missionary was sent by Frontenac to explore the Mississippi? 1175.
- How did Joliet lose all his maps and papers on this voyage? 977.
- What large island is owned by Menier, the French chocolate-manufacturer 80.
- What caused the assassination of that romantic hero, La Salle? 1033.
- What Franciscan explorer sailed with La Salle? 861.
- Who was Henri de Tonti? 1923.
- What was the dying tribute Montcalm paid to his noble English conqueror? 1203, 1255.
- What memorable battle wrested supremacy from the French? 4.
- Who was the first Roman Catholic bishop of Quebec? 1037.
- What is a proof of the broadmindedness of the British government? 1037.
- Who is Quebec's most honored citizen? 1036.
- What distinguished citizen of Quebec endowed a magnificent agricultural school? 1573.
- What great university was founded in 1811? 1136.
- What Canadian educator stands in the first rank of American thinkers? 1189, 1037.
- What great French pioneer was loved by the wild people of the forest, by courtiers and close-fisted merchants? 366.
- What island is a paradise for summer tourists? 1547.
- How could the Indians get to any part of New Brunswick? 1324.
- What splendid park is a paradise for campers? 50.
- When did the actual career of Ontario begin? 1384.
- When did the Fenians invade Canada? 655.
- What splendid agricultural college in Ontario? 810, 1228.
- What governments closely approach civic perfection? 1385.
- What large city is supplied with electric power from Niagara Falls? 1924.
- What department-store employs 4,000 hands? 1924.
- Where is the residence of the governor-general of Canada? 1400.
- What improvements have been made in the St. Lawrence channel since 1857? 1659.
- What building is architecturally one of the most imposing on the continent? 1924.
- What part of Toronto University was founded by the Basilian Fathers? 1661.
- What college sent out the first missionaries for the Church of England in Canada? 2115.
- What noble count changed the course of New World history? 720.
- On what historic ground did he camp 234 years ago? 1005.
- How is Niagara illuminated? 1345.
- What was Anthony Trollope's tribute to Niagara Falls? 1346.

- What naturalist discovered the lowest form of animal life? 509.
 What dispute was jokingly called the Aroostook war? 111.
 Who discovered the Klondyke goldmines? 1007.
 What celebrated dispute did this reopen between Canada and the United States? 38.
 What is Sir Wilfrid Laurier's patriotic hope for the future of Canada? 1036.
 What Irish representative to the British Parliament was once leader of the Liberals in Canada? 225.
 Upon what Indian reserves was built the first church (Episcopalian) in Upper Canada? 260.
 What Indian chief translated *The Gospel of Mark* and *The English Prayerbook* into Mohawk? 260.
 Where was the first large suspension-bridge built? 266.
 For how long is copyright granted in Canada? 453.
 How many times have Fenians invaded Canada? 655.
 What Canadian statesman was governor of the Windward Islands and later of British Guiana? 875.
 What indemnity did the Hudson Bay Company receive for its rights? 893.
 Where is left a remnant of the Huron Indians? 900.
 What Canadian statesman was offered a knighthood three times but declined? 1137.
 When was use first made of power at Niagara? 1346.
 When was work first begun at Niagara to develop electric power? 1346.
 What Anglo-Canadian novelist is a member of the British Parliament? 1423.
 What Indian chief was a brigadier-general in the War of 1812? 1879.
 What Indian put off his uniform and sword and dressed like an Indian because he believed he would be killed in battle? 1880.
 By whom was Vancouver founded? 2001.
 How do the Huron Indians tell the story of their origin? 900.
 Where was the first modern cantilever bridge built? 267.

UNITED STATES.

- How should United States history be studied? 1977.
 How did Queen Elizabeth playfully name Sir Walter Raleigh's instability of character? 1584.
 When did Raleigh say: "This is a sharp medicine, but it is a sure cure for all diseases"? 1584.
 How did Raleigh honor his queen? 2024.
 The land of what great city was bought for beads, brass ornaments and bright cloth? 1336.
 What celebrated Virginian named New England? 1149.
 Where is Plymouth Rock preserved upon which the Pilgrim Fathers landed? 1507.
 What is the first written constitution we have any historical account of? 1490.
 What caused the first battle between Englishmen in America? 1182.
 When was the Mississippi River the western boundary of Virginia? 2024.
 Why is Connecticut called the Constitution State? 444.
 Who was exiled for saying the government should not control religion? 2088.
 Who was the first Chief Tammany? 517.
 To what rebellion can the Revolution be traced? 154.
 What six great colleges were founded before 1700? 1977.
 What dispute was settled by the celebrated Mason-and-Dixon line? 1184, 1448.
 What fortress, taken and destroyed by the New Englanders, cost \$5,000,000, and was 30 years in building? 1118, 1977.

- When did the Continental Congress make this noble declaration: "Religion, morality and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall be forever encouraged"? 1375.
- Where was Washington initiated into the business of war? 1496.
- Why did he think Providence had preserved him for some great duty? 2048.
- What explorations were carried on by Jesuit missionaries? 714.
- What important mission was entrusted to Washington when he was only 21? 714.
- What war prepared the colonists for the War of Independence? 1977.
- At what meeting in 1754 did Benjamin Franklin suggest the idea of uniting the colonies? 39.
- What noted Indian fighter had the first white child in Kentucky, and performed the first marriage ceremony? 245.
- What governor forced women to wear veils at all public assemblies? 614.
- Who were the first Puritans? 1564.
- Tell some of the adventures of Captain John Smith? 1770.
- What was one of the direct causes of the American Revolution? 1978.
- Upon what great principle of justice was Parliament itself founded? 616.
- What eminent English statesman made one of his greatest speeches in favor of the colonists? 1808, 1496.
- Where was the first regular newspaper published? 248, 1343.
- What was the original name of *The Saturday Evening Post*, founded by Franklin at 23? 708.
- Where did the first colonial Congress meet? 442.
- What was the Continental Congress? 443, 1978.
- When did the first Congress of the United States meet? 443.
- Whose portrait was on the first United States postage-stamp? 1809.
- What postage-stamp is worth \$375? 1809.
- Who was the first successful postmaster-general? 1536.
- When was letter-postage reduced to two cents an ounce? 1536.
- When did one cent and two cent postal cards come into use? 1537.
- How many million pieces of mail go to the Dead Letter Office per year? 510.
- What prophetic words were inscribed on Liberty Bell 23 years before the signing of the Declaration of Independence? 513.
- At what battle did the political existence of the United States begin? 1978.
- What celebrated strategy proved the turning point of the war? 1978.
- How did the famous Ordinance of 1787 help to bring about the Federal Union? 1979.
- When was the city of Washington made the capital of the nation? 2087, 1980.
- What president first occupied the White House? 2047.
- What fourteen masters did George Washington have to serve? 2049.
- What high place did Frederick the Great give to General Washington? 2049.
- Who uttered this celebrated tribute to Washington: "First in war, first in peace and first in the hearts of his countrymen"? 2049.
- What president more than doubled the area of the United States? 1980.
- What president was called the sage of Monticello? 968.
- What brave little woman guided the celebrated Lewis and Clark Expedition? 1061.
- How did Jefferson almost cripple New England? 611.
- When did the idea of states' rights first become prominent? 1814.
- Why was the Hartford Convention accused of treasonable designs? 846.
- What famous Indian was an English brigadier-general? 1879, 1876.
- In what administration did the president belong to one party and the vice-president to another? 1520.

- What two brilliant orators have been defeated three times for the presidency? 280, 407.
- What are the words of the Monroe doctrine? 1253.
- Who were the National Republicans? 2075.
- When did the Democrats and Republicans form one political party? 623.
- What sarcastic name was given to the Compromise Bill of 1850? 1382, 438.
- What was the Missouri compromise? 1242, 407.
- What was intended by the Wilmot proviso? 546.
- What did "squatter sovereignty" mean? 1981, 546.
- Who was the author of the Nullification Act that Jackson called treason? 308, 1785, 852.
- How did Texas avenge the death of David Crockett and his heroic comrades, 479, 36, 1673.
- What was the first great blow delivered to states' rights? 2063, 836.
- What laws protected the kidnapers of free negroes and forced these again into slavery? 722.
- What was the Gadsden purchase? 728, 100.
- What territory was discovered by an Italian friar and an African slave? 100.
- What Indians live in immense apartment-houses five stories high? 1559.
- Are the cliff-dwellers the same as cave-men? 100, 353.
- What is the Urim and Thummim of the Mormons? 1263, 1992.
- What conflict did the Mormons have with the Federal government? 1995.
- Who invented the Macintosh coat? 1640.
- Name six remarkable inventions that appeared between 1830 and 1850? 1981.
- Who were the Underground Railroad "conductors" for fugitive slaves? 1966.
- What was the memorable Dred-Scott case? 1869.
- What chief justice decided that slaves were not "persons" but "property"? 1982.
- What state declared that it might annul the laws of Congress? 1785.
- What colony first raised a military force to oppose English government? 1785.
- What state was the leading exponent of states' rights? 1785.
- What state was the first to secede before the Civil War? 441.
- How has the state been saved from the ignorant negro voters? 1785.
- How were the Confederate troops outnumbered in the Civil War? 1982.
- How many men were killed in the draft-riots in New York city? 548.
- What general was dismissed from the army after the Battle of Bull Run? 1531, 288.
- What great battle decided the Civil War? 762.
- After what desperate battle did Grant write his famous message: "I will fight it out on this line if it takes all summer"? 1804.
- What six books did Lincoln own when he was 21? 1073.
- How did some fence rails he split help to win him the presidency? 1073.
- Did the Federal government intend to assail the Confederate states when they seceded? 1074.
- What Confederate was one of the greatest soldiers America has produced? 1046.
- Did Robert E. Lee know the Union must triumph? 1047.
- How did Grant save Lee from being tried for treason? 794.
- What is the Fifteenth Amendment? 1595.
- Who were those low-principled northerners known as carpet-baggers? 340.
- What was the dreaded Ku-Klux Klan? 1013.
- Why did the government issue greenbacks? 1792.
- Who introduced Mardi Gras in this country? 1169.

- When and where was the first railroad built in the United States? 1581.
 How many miles of railroad in the United States in 1908? 1582.
 How many miles of railroad in the world in 1908? 1582.
 What is the strength of the United States army and navy? 1984.
 What is the population of the United States of each: Indian, Negro and foreign born? 1976.
 What is the salary of each cabinet officer? 1984.
 When was the Naval Department of the United States formed and by what officers was it controlled? 1985.
 How did the naturalization laws of the United States compare with those of other countries? 1307.
 How is the Signal Service of the United States operated? 1755.
 In what way are taxes imposed in the United States? 1874.
 How many judges are there in the Supreme Court of the United States? 467.
 What is the duty of consuls? 448.
 What is the present policy of the United States government with regard to the Indians? 921.
 To whom is the United States indebted for the purchase of Alaska? 1730.
 What is the most populous city of southern California which was founded by the Spaniards? 1116.
 What came near involving the United States with Chile in 1891? 388.
 How is the number of representatives in Congress regulated, and how often is their number changed? 442.
 Who commanded the famous *Alabama*? 1722.
 When did the first Colonial Congress meet? 442.
 What celebrated Polish general took part in the American Revolutionary War? 1011.
 What was the beginning of the postoffice? 1536.
 Which was the last settled of the thirteen states? 752.
 Where are the mints of the United States? 1237.
 What famous battle was fought at Gaines' Mills? 728.
 What are the most noted cases of impeachment? 917.
 In what war was the *Monitor* first used? 1251.
 What persons are barred from serving as electors? 596.
 What tribe of Indians took sides with the British during the Revolutionary War? 376.
 Why was the first political party called Federalists? 1519.
 What naval battle is known as Perry's victory? 1454.
 Which presidents have been elected by the House of Representatives? 1545.
 Whom do the Americans address as His Excellency? 12.
 In what famous battle did the British lose twenty-six hundred and the Americans but six men killed and thirteen wounded? 952.
 What general in the Civil War was called Superb? 833.
 What harbor was headquarters for the northern division of the American fleet during the War of 1812? 1651.
 What is the Signal Service? 1755.
 What was the beginning of the second Seminole war? 1396.
 When was the town of Chicago organized? 379.
 When did the Democratic party come into existence? 1520.
 What year were there four candidates in the field, all claiming to be Democrats? 1520.
 Who led the Whig party and what ground did it take? 1520.
 What first weakened the Whig party? 1520.
 When did the Whig party cease to exist? 1520.
 When did the Anti-Masonic party arise? 1520.
 Of what was the Republican party formed, and when? 1520.
 When were each of the three following parties formed: Greenbackers, Constitutional Union and Union Labor party? 1520.

- Where did the first and the last battle of the Revolution take place? 1520.
- What were the principal features of President Polk's administration? 1518.
- Who commanded the "Green Mountain Boys," and in what battle? 52.
- When and by whom was the District of Columbia ceded to the United States? 535.
- What is the oldest permanently settled city of Iowa? 556.
- What was the first instance of negro slavery we have in the United States? 2024.
- When was the beginning of the modern navy of the United States? 1313.
- What caused the Seminole War in the United States? 1722.
- What was the Stamp Act and when was it repealed? 1808.
- When did St. Louis become a town? 1659.
- Who discovered the source of the Mississippi River? 1690.
- Who was appointed commander of Florida with orders to plant a Spanish colony, and with what results? 1203.
- What was the early postal service of the United States? 1536.
- What is the extent of the Postoffice Department? 1537.
- What are the duties of the office of Attorney-General? 1985.
- Who was founder of Maryland? 1182.
- Which was the first state to ratify the Constitution? 517.
- What slave state did not secede during the Civil War? 517.
- In what state of the Union are the people nicknamed the Blue Hen's Chickens, and why are they so called? 517.
- What state has a pillory and whipping-post? 517.
- What state's name signifies the Land of Flowers? 683.
- How and by whom was Florida discovered? 683.
- What is the great corn state of the Union? 935.
- What Indian war cost the United States thirty million dollars? 379.
- What tribe of Indians owned slaves and fought with the south? 394.
- Who were the first people to visit Michigan? 1219.
- When was Lincoln's name presented for the vice-presidency by the Illinois delegation at the national Republican convention? 1074.
- Who made the first settlement in Alabama? 36.
- What was the most important act of Jefferson's administration? 952.
- What was the most terrible and destructive battle of the Civil War? 762.
- When did Congress adopt the national bank system? 167.
- What states have passed laws prohibiting the sale of liquor? 1927.
- What was the first settlement after Jamestown? 38.
- When was the United States flag adopted? 679.
- What was the earliest English settlement in the United States? 959.
- Where are the United States mints located? 1238.
- What city in the United States is third in importance as to exports? 1330.
- Where is the United States Artillery School? 115.
- Where is the seat of our Naval Academy, and by whom founded? 74.
- What was the character of the first United States postage stamp? 1809.
- When and by whom was the first tariff act drawn up in the United States? 1871.
- What was the first tariff measure enacted in the United States to protect industries? 1871.
- What state passed an act in 1833 declaring the United States tariff-law null? 1785.
- What completed the ruin of the Federal party in the election of 1816? 845.
- What was the largest amount ever owed by the United States government? 1305.
- When did postal cards come into use? 1537.
- When did free mail delivery begin? 1537.

- What treaty was made on the spot where Philadelphia now stands? 1446.
 What bishop was appointed major-general by Jefferson Davis? 1518.
 What territory comprises the Louisiana purchase and what was the consideration? 1119.
 When was Louisiana admitted as a state, and what its area? 1119.
 What large concession did Mexico make with the United States in 1848? 1216.

ASIA.

- Where is thought to be the cradle of civilization? 119.
 What European countries have at different times founded colonies in Asia? 119.
 What European countries are now struggling for mastery in Asia? 119.
 Who was first to sail around Asia? 1750.
 What famous tomb in India is described by travelers as a glimpse of Paradise? 1866.
 What was the beginning of the Selucian Empire? 1720.
 When was Phœnicia in her greatest power and glory? 1473.
 What Assyrian placed the ancient world under one ruler for twenty years? 125.
 What city was the center of the world's traffic in the twelfth century? 278.
 What country was closed against other nations till 1876? 1011.
 Who was the first Assyrian king to invade Egypt? 625.
 What first weakened Tyre when at its best? 1963.
 What city was the home of Xerxes and Cyrus the Great? 1680.
 Who was the greatest king of Babylonia? 153.
 What is the most extensive and powerful kingdom in western Asia? 1455.
 Who was the real founder of the first Assyrian empire? 125.
 At whose death was Turkestan split into fragments? 1955.
 From what does Mesopotamia derive its name? 1210.
 In what way has an accurate account of the reign of Darius of Persia been obtained? 504.
 What evidence have we that the Assyrians reached a high degree of wealth and civilization? 125.

AUSTRALIA.

- When did Australia have its beginning as a British settlement? 142.
 For what purpose were these early settlements used? 143.
 When was Australia found on a geographical chart? 142.
 When did the reception of convicts cease? 144.
 What gave an impulse to the colony in the early fifties? 142.
 When did the government become representative? 142.
 When did education come under state control? 143.

INDIA.

- The invasion of India by what people brought the Sanskrit language and the Hindu religion? 919-20.
 Who was the greatest sovereign India ever had? 920.
 What European nations began settlements in India early in the eighteenth century? 920.
 When did the British East India Company settle in India? 920.
 When and by whom was the first charter granted to the East India Company? 576.
 Who was the youngest governor-general ever sent to India? 497.
 When did the British East India Company cease to exist? 920
 What emperor of India liked to be called Conqueror of the World, and was made a prisoner for life in his own castle? 140.

LITERATURE

ORIENTAL.

- What can you tell about the vastness of Chinese literature? 1080.
 Are there any others that are as large? 1082.
 Who was the greatest and wisest of Chinese? 441.
 What has been his influence? 441.
 What are the Chinese classics? 1080.
 Whose books were used in the Chinese government examinations until a few years ago? 1080.
 What are the histories of China? 1080.
 Of what are the philosophical and art divisions of the Chinese library composed? 1080.
 Of what is the *belles-lettres* division composed? 1080.
 Is Chinese poetry an important division of their literature? 1080.
 What classes of Chinese literature, though really good, are not included in the national library? 1080.
 When was paper first used in printing? 1080.
 What is the character of Sanskrit literature? 1080.
 What kind of writings are the most important Hindu writings? 1080.
 Did the Hindus write any great epic poems? 1080.
 What class of Hindu writings is found all over the world? 1080.
 What is the rank of Hindu drama as compared to Greek and to English? 1080.
 What are the oldest literary documents known? 919.
 What literatures were lost for thousands of years and how were they recovered? 125, 152, 1081, 1635, 486, 873, 1082.
 How early do we find Babylonian writings? 1080.
 What is their nature and how were they written? 1080.
 Had the Babylonians any great poems? 1080.
 What kinds of books did they write? 1080.
 In the ruins of what famous city was Assyrian literature found? 1352.
 What was the principal object of the foundation of the Assyrian library? 1081.
 What can you tell about this library? 1081.
 When was most of it written? 1081.
 Which came first: Babylonian or Assyrian? 125, 152, 1081.
 Did Assyrian influence Hebrew literature? 1081, 125.
 For what are almost all civilized nations indebted to the Phœnicians? 1081.
 Who was the Marco Polo of the Phœnicians? 1081.
 Where was the key to Assyrian, Babylonian and Persian literature found? 271, 486, 504, 1040, 1352, 1589, 1635.
 What is the Zend-Avesta? 1081.
 Who is believed to have written it? 2136.
 What people use it? 1426.
 When did Persian literature flourish most? 1081.
 With whom did Persian poetry reach its height? 1081.
 Who was the greatest of Persian lyric poets? 1081.
 Who wrote the *Rubaiyat*? What does the name mean? 1382.
 What is the greatest production of Hebrew literature? 1081, 209.
 What sorts of books did its authors write? 209.
 Were any Jews historians? orators? philosophers? poets? 209.
 What writings by Jewish writers are not included in the Protestant canon of the Bible? 1081.
 What are the great translations of the Bible? 209, 759, 970, 1915, 2030, 2114.
 Who was the first of modern commentators on the Bible? What influence did he have on the growth of Judaism? 1081.
 What great modern philosopher was a Jew? 1799.
 Who are some of the modern Jews who have taken prominent rank in literature, science and art? 1082.
 What are Egyptian hieroglyphics? 873.
 How were they deciphered? 1635.

What is *The Book of the Dead*? 1082.
 Who was Egypt's first historian? 591, 1157.
 What varieties of literature had the Egyptians? 1082.
 How early was the science of medicine known in Egypt? 1082.
 Who was Egypt's Homer? What poem the Egyptian Iliad? 1082.
 Did the Egyptians write novels? 1082.
 What early literature is Christian? 1083.
 What was the most important result of Syriac writings? 1083.
 What is the oldest book in Syriac in existence? 1083.
 How were prize poems in Arabia sometimes written? 1084.
 What can you tell about the expansion of Arabian literature in the eighth and ninth centuries? 1084.
 What was the condition of Arabia during Europe's dark ages? 1084.
 Upon what were Arabian law and theology based? 1084.
 In philosophy whom did the Arabians regard highly? 1084.
 In mathematics for what are we indebted to the Arabians? 1084.
 From what Arabian literature did that of Europe gain much? 1084.
 How did the stories of *The Thousand and One Nights* come to be told? 1084.

GREEK.

What are the two great Homeric poems, and what can you tell of them? 1082, 882.
 Was Homer the only epic poet of Greece? 870, 1082.
 What is the difference between a lyric and an epic poem? 1510.
 Who was the greatest Greek lyric poet? 1082, 1491.
 What other lyric poets won undying fame? 96, 1678, 1759.
 What caused the growth of the drama? 1082, 550.
 Who were some of the most important Greek dramatists? 20, 97, 632, 1781.
 What tragedian does tradition tell us was killed by an eagle dropping a tortoise, to break its shell, on his bald head, mistaking it for a stone? 20.
 Who was the greatest Attic tragedian? 20.
 Who is the head of the Greek dramatists? 550.
 What Greek dramatist is called the world's greatest laughter? 97.
 Who and what was Menander? 550, 1082.
 Who were some of the most important Greek historians? 1082.
 Which was the father of history? 868.
 Which was the philosophical historian? 1908.
 Which was the gentleman of leisure? 2117.
 Who were the three great Greek philosophers? 1082.
 Which one has had great influence on all thinkers since? 1082.
 What are the distinctive principles of the teachings of Socrates? 1502.
 What feature of Greek law caused oratory to become so prominent? 1082.
 Who was the greatest of orators? 1082.
 Who was the greatest writer of Greek comedies? 97.
 What city, founded not long before Demosthenes died, rivaled Athens in literature and scholarship? 45.
 What great translation of the Scripture was made there? 972, 209, 1762.
 What island contains but three towns of any size, though Vergil told of its hundred cities? 477.
 What has made Troy famous to the literary world? 1945.
 What made the Greek poet Theocritus famous? 1899.
 From what is the language of the Greeks supposed to have been derived? 801.
 What caused the decline of Greek literature? 1082.
 What was the most famous ancient library? 46.
 Where was it? Who founded it? 591.
 What story is told about its destruction? 46.
 What was Plutarch's professed purpose? 1506.

What important theologian sought to combine the results of Greek philosophy with the gospel during the second century? 1393.
 What is meant by the term pseudonym? 1188.
 To whom is the world indebted for the first complete edition of Homer?

ROMAN.

When did Roman literature commence? 1083.
 Did Rome ever have any really native literature? 1083.
 Upon what was Roman drama founded? 1083.
 Who were the Roman dramatists? 1083.
 By whom and when was the satire founded? 1083.
 What is said to have caused the death of Terence? 1891.
 In what branches of literature did Rome excel? 1083.
 Who was the greatest of all epigrammatists? 1178.
 What can you tell of Cicero? 1083.
 What noblest Roman of them all was author, orator, scholar, soldier and statesman. 303.
 When was the Augustan age of Roman poetry? 1083.
 Who were some of the great writers of this age? 1083.
 What can you tell of their writings? 1083.
 Do any Roman epics compare with those of India and Greece? 1083.
 What man of the world is one of the world's lyric poets? 1083.
 Who was the chief comic dramatist of Rome? 1503.
 Who were the great Roman prose writers? 1083.
 Which were historians? Which essayists? Which letter-writers? 1083.
 Who was Nero's tutor, and what was his fate? 1723.
 What emperor was Plato's philosopher ruling the world? 139.
 Who was the earliest and greatest letter-writer in the world? 398.
 Who was the last of the great Latin poets? 984.
 From whom do we derive our impressions of the life of the upper classes of the first century? 1505.
 Who was the real first Roman historian? 1083.
 What great writer wrote satires against the rich? 1083.
 Who were other Roman writers of a later period? 1083.
 What Christian authors glorified the last days of Latin literature? 58, 137, 970.

ITALIAN.

What was the literary language of Europe during the middle ages? 1084.
 Who formed a trio of great Italian writers? 1084.
 In what country did literature reach its height in its opening? 1084.
 What did Dante's *Divine Comedy* do for literature and the Italian language? 501.
 Who was the Laura whom Petrarch immortalized? 1462.
 What works made Petrarch famous? 1084.
 What other great poets are glories of Italy? 96, 1873.
 Are there any Italian dramatists? 1084.
 What Italian historical product has been translated into most modern languages? 1084.
 Who was the foremost Italian of the seventeenth century? 730.
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 Who was known as the jester of France? 1577.
 What Frenchman was the first and greatest of essayists? 1254.
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- For what is the age of Louis XIV noted? 1085.
 What Catholic churchmen were great pulpit-orators? 1187.
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 What work of this period is precious to Christians? 1085, 1427.
 What French scientist and writer founded modern philosophy? 522.
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 What has been the most brilliant period of the Provençal language? 1554.
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 Who was the queen of letter-writers? 1729.
 What can you tell about Voltaire and his influence? 2029.
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 Who was Rousseau? 1638.
 What natural history, though not authentic, is considered a French classic? 1085, 286.
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 What French historian set historical study on foot in Europe in the nineteenth century? 813.
 Who are the leading philosophers and critics of this century? 1086.
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 Of whom did Byron say: "He laughed Spain's chivalry away"? 361.
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What Scotch philosopher "woke him from dogmatic slumbers"?
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- How does the Queen Anne period of literature rank? 1090.
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- What were some of his leading writings? 1090.
- Who wrote *The Seasons*? 1906.
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- For what are Hume and Robertson noted? 897, 1090.
- Who wrote *The Decline and Fall of the Roman Empire*? 764.
- What were the great names in English philosophy and kindred topics during the Queen Anne period? 1090.
- Who wrote *The Wealth of Nations*? 1769.
- Who were the two principal essayists of this period? 1090.
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- What man is known only as another's biographer? 249.
- What can you tell about *The Traveler* and *The Deserted Village*? 778.
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- What was Goldsmith's most popular novel? 1090, 2018.
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- Who wrote *The Ancient Mariner*? 421.
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- What effect have Ruskin's views had on English art? 1644.
- What famous poem, found almost everywhere, brought the writer only twenty-five dollars for the copyright? 1229.
- What Scotch girl was made immortal by the pen of John Brown? 1172.
- Who was the greatest writer of sea-stories? 1176.
- What book made Thomas More famous? 1996.
- Who was the translator of *Ossian*? 1397.
- What celebrated author was in debt \$700,000 at the age of 55, all of which he paid with his pen? 1709.
- Who declined the position of poet-laureate in favor of Southey? 1709.
- What book did Dr. Johnson assert to be the first in the world for its knowledge of the human heart? 1611.
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- Who was styled the Moses of modern science, leading it to the Promised Land, but himself only viewing it from Mount Pisgah? 154.
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- What made Laurence Sterne forever famous? 1824.
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- What poet was made poet-laureate in 1813? 1788.
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- Who was John Woolman? 1093, 1570.
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 The Quest of the Holy Grail. 790.
 The young girl who was told by a heavenly voice to go to war. 973.

The "Kid Judge" and the boys who robbed the pigeon roost. 1076.
How the emperor's mother made garlands of cornflowers for her children. 686.

METEOROLOGY

With what does this science deal? 1212.
What are included under aerial phenomena? 1212.
What are included under aqueous phenomena? 1212.
What are included under luminous phenomena? 1212.

AERIAL PHENOMENA.

What is a cyclone? 492.
In what direction does the wind travel? 492.
What is the difference between a cyclone and a tornado? 492.
What is an anti-cyclone? 492.
How do the cyclones of the southern hemisphere differ from those of the northern hemisphere? 492.
What is a storm? 1833.
What is the connection between cyclones and storms? 1833.
How does the weather forecaster make his predictions? 1833-4.
What is a blizzard? 1834.
How are winds produced? 2094.
At what rate does a barely perceptible wind move? 2094.
At what rate does a storm blow? 2094.
What is the velocity of a hurricane? 2094.
What are the trade winds? 2094.
What are periodical winds? 2094.
How are the rate and pressure of wind measured? 71.

AQUEOUS PHENOMENA.

Of what are clouds composed? 412.
What are cirrus clouds? 412.
What are cumulus clouds? 413.
What are strata clouds? 413.
What are nimbus clouds? 413.
Why do the clouds not fall upon the earth? 413.
What is the difference between clouds and fogs? 688.
What is the principal source of fog? 688.
What is another frequent source of fog? 488.
What must be present in the air before fog can form? 488.
How is dew formed? 526.
What is the difference between the formation of dew and the deposit of water upon a tumbler? 526.
During what kinds of nights will dew not form? 526.
What is the explanation of these facts? 526.
What is the "dew point"? 526.
What is frost? 720.
What is the difference between the formation of dew and that of frost? 720.
Where are the most remarkable formations of frost seen? 720.
Why is frost more common in country districts than in towns? 721.
What is black frost? 721.
What are the most important causes of rain? 1582.
What are four principles regulating the relation of the winds to rainfall? 1582.
What places are there on the earth where the rain rarely or never falls? 1582.
What effect upon the rainfall have the trade winds in the tropics? 1582.
How may Europe be divided in respect to rainfall? 1582.
What effect have the Rocky Mountains upon the distribution of rain in the United States? 1582.
What is hail? 824.
When do hailstorms occur? 824.

What is the structure of a hailstone? 824.
 What is the probable explanation of hailstorms? 824.
 What is snow? 1773.
 How is snow formed? 1773.
 What causes the whiteness of snow? 1773.
 What is meant by the "snow line"? 1773.
 Why does snow never collect to an indefinitely great depth? 1774.

LUMINOUS PHENOMENA.

Where does the aurora borealis occur? 140.
 How does it appear in intermediate latitudes? 140.
 How does it appear in higher latitudes? 140.
 What makes it seem probable that auroras are produced by electrical discharges? 140.
 What sort of a spectrum does the aurora present? 140.
 Where are auroral displays most frequent? 140.
 What is lightning? 1069.
 Who established the connection between electricity and lightning? 1069.
 Is the source of electrical charges known? 1069.
 What is the rainbow? 1582.
 Of what does the rainbow consist? 1582.
 What are the two bows called? 1583.
 Who first gave the explanation of the rainbow? 1583.
 Who completed this explanation? 1583.
 What is a mirage? 1239.
 What is the cause of a mirage? 1239.
 In what different ways does the object appear? 1239.
 What is the explanation of this? 1239.
 What ship was discovered by means of a mirage? 1239.
 What is twilight? 1960.
 If there were no atmosphere, what would become of the twilight? 1960.
 In the polar regions how long does the twilight last? 1960.
 What theories are there as to the matter in the atmosphere that thus reflects the sunlight? 1960.

MINERALOGY

What does the science of mineralogy embrace? 1230.
 What parts of the subject are dealt with in physical mineralogy? 1230.
 What does chemical mineralogy consider? 1230.
 What is shown in descriptive mineralogy? 1230.
 When was it that minerals began to be properly studied and classified? 1231.
 How were minerals grouped in the system presented by Mohr? 1231.
 What methods are now used? 1231.
 How do minerals vary in hardness? 1231.
 What mineral exhibits different shades of five different colors? 1231.
 What are the six systems according to which all crystals, natural and artificial, are classified? 1231.
 What is meant by "twinning"? 1231.
 What are the four principal ways in which minerals have been formed? 1231.
 What is pseudomorphism? 1231.
 By what process has petrified wood been formed? 1231.
 Where is the topaz found? 1923.
 Where is the tourmaline found? 1928.
 How did the amethyst get its name? 63.
 How are pearls obtained? 1435.
 Where are the finest specimens of onyx found? 1168.
 Where is the most celebrated opal now found? 1385.
 Where is the turquoise mostly found? 1958.
 In whose possession are the finest specimens of turquoise supposed to be? 1958.

- What charm is the turquoise supposed to have? 1958.
 What is the difference between a male and a female sapphire? 1678.
 How can a diamond be distinguished? 527.
 What famous diamond was found by a negress? 527.
 Where was the largest diamond of North America found? 527.
 What famous diamond is mounted in the scepter of the Czar of Russia? 527.
 Where is the richest diamond mine in the world? 527.
 What element in lead and coal is the same that, crystalized, forms the diamond? 332.
 What country produces nearly one-half of the zinc of the world? 756.
 When and where was the largest gold nugget ever discovered? 162.
 Where is the richest copper mine in the world? 452.
 What silver region produces one-third of the silver output of the world? 1758.
 What state furnishes one-third of the gold, silver, copper and lead mined in the United States? 1254.
 What metal expands less by heat than any other? 1502.
 What metal will neither tarnish nor rust? 80.
 What metal is nine times heavier than water? 452.
 Where is sulphur found? 1846.
 What is the lightest of all metals? 1537.
 What are pyrites? 1566.
 What is thallium, when and how discovered? 1897.
 What mineral is used to make the Drummond light? 1071.
 How is steel produced? 1819.
 What has reduced the price of steel very much? 1820.
 What metal rusts most easily, and why? 1649.
 What is known as Prince's metal? 1644.
 What metal is fluid when not heated? 1206.
 Where do we find the purest iron ore in America? 1218.
 Where are the richest copper mines in the world? 1218-9.
 What mines produce one-third of the iron of the United Kingdom? 1222.
 How are metals extracted from ores? 1211.
 What state yields the most zinc? 1241.
 From what is magnesium obtained? 1145.
 How were coal beds formed? 749.
 What is the extent of the coal fields of the United States? 414.
 What is the largest mineral vein in the world? 2025.
 Where are the largest manganese mines in the world? 2023.
 What is the favorite metal for making casts of statues etc., and how is it prepared? 1598.
 What mineral may be woven into cloth? 116.
 What gives the prevailing color to granite? 792.
 What is the study of shells called? 1738.
 How are shells formed? 1737.
 Where is the best white sand in the world found? 773.
 What is the process of assaying? 122.
 What is the process of mining? 1232.
 In what various forms do minerals occur? 1232.
 What are the more important problems of mining? 1233.

MUSIC AND DRAMA

- Who was the father of the modern comic opera? 1372.
 Who has been called the singing flower of beauty? 806.
 When and where was Mendelssohn born?
 At what age did Mendelssohn begin the study of music? 1202.
 What is the national hymn of France? 1176.
 Where was Mozart born? 1274.
 Who wrote *America*? 1770
 Who was the great genius of the fifteenth century, and also painted the celebrated picture of The Last Supper? 1056.

- What great singer was admitted into the musical conservatories of Stockholm at the age of nine years? 1075.
- What singer of renown born in Naples gave instructions in singing to Queen Victoria? 1015.
- At what place is the famous miracle play produced every ten years? 1368.
- How did Adolph Sax greatly influence military music throughout the world? 1686.
- How did Ole Bull lose his large fortune? 287.
- What drama did Carlyle call the greatest dramatic work of the eighteenth century? 1689.
- What musical instrument is regarded as the ancestor of the piano? 559.
- Who was the greatest Italian composer? 1411.
- What was the earliest opera, and who was its founder? 1385.
- Where did melodrama originate? 1385.
- Who is the most famous modern Italian composer? 1385.
- When was oratorio first introduced? 1390.
- What great tragic actress was queen of the English stage during her time? 1752.
- Who holds the first place in London among living actresses? 1893.
- What is said to be the birthplace of the drama? 1898.
- With whom did quartettes originate? 1571.
- For what two great discoveries are pianists indebted to Bach? 153.
- What is the national musical instrument of Scotland? 157.
- What famous musician was taught to play the harpsichord at the age of four years? 194.
- What famous musician became totally deaf? 194.
- What is the Stabat Mater? 1807.
- When were actresses first allowed on the French and English stage? 1898.
- What was the first theater and where was it? 1898.
- Where was the first modern theater built? 1898.
- Where was the first theater opened in America? 1898.
- What is the purpose of religious music? 1284.
- What is the test for religious music? 1285.
- What contest is going on in church choirs? 1285.
- What are the three requirements for effective religious music? 1286.
- How may forms in music be classified? 694.
- To what does form apply in music? 694.
- What is strain? 695.
- What are the primary units of thought in music? 696.
- What Germans put Germany at the head of the world in music? 153, 194, 834, 852, 1202.
- What is a saxhorn and why is it especially fitted for military music? 1685.
- Name the three chief classes of opera? 1385.
- Who are the five great living women singers? 728, 1355, 1429, 1200, 1705.
- What famous singer is called the Queen of Song? 1429.
- Who is John Philip Sousa? 1783.
- Who was the musical director at the Columbian Exposition? 1905.
- What is musical notation? 1288.
- Is there a difference between miracle plays and passion plays? 1238.
- Who is considered the most eminent of living German musicians? 1837.
- What was Wagner's last and greatest opera? 2033.
- What is known in music as pitch-representation? 1290.
- Give the name of the greatest dramatist next to Shakespeare? 550.
- At what early age did Adelina Patti make her first appearance? 1429.
- What great living American singer has sung leading parts in 40 operas? 1355.
- Who is the greatest living actress and how else gifted? 206.

What modern English actor was knighted in 1895? 943.
 What famous musician composed but one opera? 1385.
 At what age did Beethoven first show evidences of his genius? 194.

MYTHOLOGY

What goddess is made famous by Swinburne in poetic form? 129.
 What goddess is sometimes represented emerging from a golden palace and entering her chariot? 140.
 What cruel treatment did Ædipus receive from his father? 1372.
 What god became the wisest of gods by drinking from Mimir's fountain? 1472.
 What goddess is the muse of history? 1284.
 What is said of the muses? 1284.
 What hero of the Trojan War slew Antilochus in single combat? 1200-1.
 Who is called the early Roman god of war? 1176.
 What month was named in honor of Mars? 1176.
 How is Morpheus represented? 1264.
 What goddess is the muse of comedy? 1284.
 What god is forever excluded from paradise? 1452.
 What hero won a kingdom by answering a riddle? 1372.
 What goddess is the muse of tragedy? 1284.
 How did Ulysses escape from the cannibal Polyphemus? 1522.
 How did Vertumnus succeed in winning Pomona? 1522.
 What goddess is the muse of choral dance and song? 1284.
 What god held as sacred the wolf and woodpecker? 1176.
 Who is called the Greek sea god? 1320.
 Who are called the companions of Apollo? 1284.
 What does the word Saturnalia mean? 1683.
 What goddess is the muse of hymns? 1284.
 How was a vestal virgin treated if she violated her vow? 2017.
 What goddess did Apollo teach the secret of prophecy, and because she rejected his love he laid a curse on her? 346.
 Who were the Danaides? 500.
 Who was Jason? 965.
 What divinities are used as denoting the worship of ancestors, the home altar and the hearth? 1031.
 What was the hall, where were gathered the dead who had fallen in battle, called? 2035.
 What goddess was identified as a personified woman? 983.
 Who was the greatest of Egyptian gods? 1396.
 What were the Olympic games? 1381.
 By what other name was Zeus known? 1682.
 Who is the god of the earth in Egyptian mythology? 1396.
 Who is the goddess of heaven in Egyptian mythology? 1396.
 Who was called the god of heaven? 1899.
 What god was called the ruler of earth and heaven in Scandinavian mythology? 1372.
 Who was the god of love? 484.
 What goddess was spoken of as the twin sister to Apollo? 527.
 What goddess was left to die on a hill by her father at her birth because he wished for a son? 129.
 What goddess changed Tithonus into a cricket? 140.
 What king's son was abandoned by his father and found by a herdsman and raised as his own son? 1372.
 What goddess is the muse of lyric poetry? 1284.
 How were Neptune and Poseidon represented? 1320.
 How was Orpheus killed? 1395.
 Who was the goddess of dawn? 1232.
 Who was the goddess of the muse of poetry or passion? 1284.
 Who was Uranus? 1991.
 From what Greek god does our word tantalize come? 1870.
 What is said of Saturn in later life? 1682.

- What goddess was the muse of astronomy? 1284.
 Who were the vestal virgins and how long were they held in service? 2017.
 What god ruled the winds, seasons and agriculture? 1906.
 Who was Psyche? 1556.
 What are the Pleiades? 1504.
 When was the festival of Flora held? 683.
 What goddess was supposed to have power of restoring the aged to youth? 857.
 What goddess when she died was believed to have passed into the star Sirius? 945.
 What Roman god was it whose temple was open in time of war and closed in time of peace? 960.
 What god is the type of manly strength and manly endurance? 867.
 Whose name was changed to Aquarius, and what does it mean? 736.
 What river did the Hindoos believe to bathe in her waters will wash away sin; to die and be buried on her banks secures free entry to eternal bliss? 736.
 What nymphs in Greek myth are goddesses of trees and woods? 555.
 What god made wings for himself and son to escape from imprisonment? 495.
 Who was Quirinus? 1631.
 What god cut up his brother's body in pieces and scattered them far and wide? 945.
 How did Deucalion and Pyrrha repopulate the world after the flood? 524.
 How did Pythia always appear and what was her office? 518.
 What goddess was the daughter of Hyperion? 140.
 What god had a banquet for his people every day? 2035.
 What goddess was the wife of Saturn? 1682.
 Who was called the god of wine? 153.
 What heroine was called the swiftest of mortals? 129.
 For what crime was Atlas condemned by Zeus to a very great burden? 133.
 What is said of Ixion? 951.
 Who was called the goddess of the morning? 140.
 Who was called the daughter of Atlas? 311.
 What famous god was the son of Venus? 487.
 Who was the goddess of the moon, and of the flocks and the chase? 527.
 Whom did Pindar consider A Sister of the Fates? 700.
 What goddess did the Romans claim? 700.
 Who was Helen of Troy, and who made her famous by verse? 858.
 Who was the goddess of womanhood? 983.
 What god was said to be the father of the Roman race? 1176.
 What god was called the god of dreams and son of sleep? 1264.
 Who was the Roman god of the sea? 1320.
 Whose music rocked monsters to sleep and stopped falling cliffs? 1395.
 What was a peri? 1452.
 What god had only one eye in the center of his forehead? 1522.
 What is a sphinx? 1797.
 What god was stricken with a fearful thirst and had all things around him to quench thirst, but could not get at them? 1870.
 What god devoured all his children at their birth except the last one? 1682.
 Who was the Roman goddess of fruits and flowers? 1524.
 What nymph did Zeus employ to keep the attention of his wife Hera by talking to her? 579.
 Who was the goddess Circe? 400.
 Who was Juggernaut? 981.
 What is said in Greek mythology about the flood and the ark? 524.
 Who was called the goddess mother, the mistress of heaven, the eye of the sun and the queen of the gods? 945.
 What is the symbol of the lotus? 1116.

- How many times was the gateway of Janus closed in seven hundred years, and what kept it open? 960.
- What is the ganga and what does it symbolize? 736.
- What god personified the beginning of the arts of sculpture and architecture? 495.
- What are dwarfs? 565.
- What twin sisters while asleep were touched on the ears by two snakes and purified, so that they could understand the language of birds and thus know the future? 346.
- What goddesses were condemned to pour water into sieves in the vain endeavor to fill them, and why condemned? 500.
- Who dedicated his oxen and cart to Jupiter and tied the yoke with a hard knot? 781.
- What goddess changed men and women into animals with her drugs and charms? 400.
- What god avenged Osiris' death? 1396.
- Who was Orestes? 1392.
- How was Orion killed? 1394.
- Who was Hebe? 857.
- What are the mermaids? 1208.
- Who is the goddess of wisdom? 1232.
- Who is Pluto and what is his surname? 1507.
- What god was suckled by a she wolf and afterwards brought up by the shepherd Faustulus and his wife? 1631.
- Who was the greatest of Grecian deities? 2131.
- How can nature worship be traced? 913.
- What did the Greeks hold to be ministers of the vengeance of the gods? 842.
- What did Hero do against her nymph Echo? 579.
- What Roman goddess protects agriculture and the fruits of the earth? 360.
- What goddess was Odin's queen? 1372.
- How does Homer picture the Centaurs? 359.
- What did the goddess Circe do for Ulysses? 400.
- Who was the Greek hero of the flood? 524.
- What goddess succeeded Hebe as cupbearer to the gods? 736, 857.
- How was Isis discovered when she was grieving over the loss of Osiris, her husband? 945.
- What are called the twelve labors of Hercules? 867.
- What is a vampire? 2001.
- What goddess was turned into stone on Mt. Sipylus? 1352.
- What three sister goddesses had only one eye among them, and what were they called? 1198.
- Who were the Gorgons? 783.
- Who was Scylla? 1712.
- Who was called the god of thunder? 1906.
- Who was the goddess of fire? 2017.
- From what god does Thursday get its name? 1906.
- What are called Lamias? 2001.
- What was Themis the goddess of? 1899.
- Who were the father and the mother of Themis? 1899.
- Who was Charybdis? 1712.
- What god was called Old Man of the Sea? 1553.
- What presumptuous youth almost set the earth on fire? 1464.
- What famous god was worshiped in Athens by offerings of cows, goats, lambs, milk, honey and wine? 1415.
- From what god does Wednesday derive its name? 1372.
- What god with his two sons was killed by two serpents that rose from the sea and for what reason? 1029.
- What goddess detained Ulysses on her island for seven years and died with grief when he departed? 311-12.
- What god never grew weary, and why? 1906.
- What goddess was the muse of epic poetry? 1284.
- What does the story of Psyche represent to critics? 1556.

NATURE STUDY

- Who are called the Seven Stars? 1504.
What god became mad when he realized he had killed his mother?
1393.
Who were the Sirens? 1762.
How was Minerva represented? 1232.
What is said of Pelops? Whose child was he? 1443.
What goddess held sacred the olive branch, the serpent and owl?
1232.
Who was Orion? 1394.
Who was god of the under world, the realm of darkness and ghostly
shades? 1507.
What is said of the Titans; who were they? 1916.
What Grecian deity was called the Father of gods and men, protector
of kings and supporter of law and order etc? 2131
What was supposed to be the stream of oblivion in the lower world?
1058.
What divinities in Scandinavian mythology personified various ele-
ments of evil? 980.
What is an idol? 913.
What did savages use as their idols? 913.
How did Homer make mention of the Harpies? 842.

NATURE STUDY

- What is a fine starting point for school work? 1307.
To what do parents pay too little regard in the first five years of a
child's life? 1307.
What does nature study include? 1308.
What is the best way to start off with nature study? 1309.
How has the camera helped nature study? 1309.

DOMESTIC ANIMALS.

- What is the value of house-pets? 889.
What are the most effective watchdogs? 889.
What are valuable outside watchdogs? 889.
What dog protects poultry from skunks and weasels? 889.
What is a dog's toothbrush? 889.
What makes a dog smell "doggy"? 889.
What will kill fleas on a dog? 889.
What is a cat's medicine? 889.
How many song birds does a cat kill in a year? 889.
What prevents cats from killing mice? 889.
What causes canaries to become diseased? 890.
What is the best seed for canaries? 890.
What causes loss of voice in canaries? 890.
What is the color of the wild canary? 321.
What will red pepper and sponge cake do to wild canaries? 321.
What are the most choice of all canaries? 322.
Why are rabbits and guinea pigs popular? 890.
How often do rabbits breed? 890.
How should rabbits be handled? 890.
How should guinea pigs be treated? 890.
What makes pigeons attractive? 890.
What are the best quarters for pigeons? 890.
Why must each family have a separate home? 890.
How may pigeons be tamed? 890.
How many squabs a year will a pair of pigeons raise? 890.
What was the first animal domesticated by man? 538.
How may dogs become civilized? 539.
What are the chief races of dogs? 539.
What is one of the best sheep dogs? 539.
What dogs are expert swimmers? 539.
How did Robert Bruce escape from bloodhounds? 539.
What is the Great Dane? 539.
What is the common badger-dog? 539.
What hounds have almost lost the power of scent? 539.

What is the most brutal of the dogs? 539.
 What is one of the oldest dogs in Great Britain? 539.
 In what country is a dog the poor man's horse? 539.
 What dog is an irredeemable thief of food? 539.
 What are the members of the cat family? 347.
 What is the American wild cat called? 348.
 What are the best known domestic cats? 348.
 What kind of a cat has no tail? 348.
 What was said of the black cat in the Middle Ages? 348.
 What is the difference between a rabbit and a hare? 1577.
 Where were 25,000,000 rabbits killed in a year? 1577.
 What is the origin of the name hare-lip? 837.
 What are the natural enemies of rabbits and hares? 837.
 What immense injury results from the absence of natural enemies? 837.
 What curious mistake is made about guinea pigs? 812.
 What is the turtle dove? 1489.
 How did Darwin use pigeons? 1490.
 Is the carrier pigeon the one that carries messages? 1490, 341.
 Are doves distinct from pigeons? 1490.

BIRDS.

How can bird houses be made cat proof? 1321.
 How are birds unlike all other animals? 217.
 Did birds ever have teeth? 217.
 How many kinds of birds are there in the world? 217.
 What is the best way to observe birds? 217.
 Name some of the water birds? 217.
 To what class do most of the song birds belong? 217.
 What kind of a bird is a common chicken? 217.
 What are the running birds? 217.
 How do the mining birds build their nests? 217.
 What bird lays its eggs on the bare ground? 217.
 What are the mound building birds? 217.
 What bird builds its nest like a baker's oven? 217.
 How does the carpenter bird build its nest? 217.
 What bird is locked up in its nest while hatching? 218.
 What are summer and winter birds of passage? 218.
 What man first saw birds of paradise in their native homes? 218.
 Does the male or the female have the beautiful feathers? 218.
 How many kinds of birds of paradise are there? 218.
 What birds are never seen in flocks? 687.
 What birds catch insects on the wing? 687.
 What bird is unjustly accused of killing many honey bees? 1004.
 What bird sings *pewit-phoebe*? 1473.
 What bird has a dreamy note of *pee-a-wee*? 1463.
 Where does the horned lark live? 1031.
 What member of the blackbird family is called a lark? 1194.
 Where do 40,000 crows assemble at one time? 482.
 What birds does the jay imitate? 966.
 Where is the red-winged blackbird found? 222.
 What bird is called a locust bird and the ax-bird? 1813.
 Are the orioles of the U. S. the same as those of Europe? 1394.
 What bird is shot for the table as reed birds? 232.
 Where is this bird called the rice bird? 232.
 What is the "gladdest bird that sings"? 233.
 What bird rides on a cow's back? 469.
 What bird has three broods a year? 1791.
 What is the American representative of the European kestrel? 1792.
 What is the bluest bird that flies in North America? 923.
 What bird is called the thistle bird and yellow bird? 778.
 What bird feeds largely upon rice? 807.
 What is the typical bird of the air? 1852.
 What bird protects the negro's chicken yard? 1179.
 What bird is called a swallow, but is more closely related to the humming bird? 1855.
 How does the catbird sing? 349.

- What is the most common bird of the South? 1244.
 What bird makes a sound like the squeak of a hurt chicken? 1245.
 What bird uses its tail in climbing? 476.
 What bird can walk on a limb head downward? 1365.
 What bird says: "Yank! Yank! Hank! Hank!?" 1366.
 How many broods do the bluebirds raise a summer? 231.
 What bird devours the eggs and young of other birds? 231.
 Is the robin in America the same as in England? 1620.
 Where does the robin-redbreast live? 1505.
 Can the humming bird be tamed? 898.
 Why is the shrike called the butcher bird? 1748.
 What birds are included among poultry? 1540.
 Why are fowls allowed in the vineyards of France? 1541.
 What are the members of the duck family? 557.
 What was the parent of our common domestic duck? 557.
 Where does she get the down to line her nest? 557.
 What duck is called the greenhead? 1152.
 What is the difference between the redhead and canvasback? 328.
 What is the favorite food of the canvasback? 328.
 Where does the duckbill live? 557.
 Why is the turkey buzzard protected by law in the South? 297.
 What bird robs the osprey? 678.
 What bird can put a whole fish in its mouth? 1442.
 What bird do the Chinese train for fishing? 456.
 What bird can fly 150 miles an hour? 647.
 What is a noble hawk? 647.
 How did the sandpiper get its name? 1647.
 How many kinds of snipe visit the U. S.? 1773.
 Where is that famous war eagle *Old Abe*? 572.
 Which of the owls should be protected? 1403.
 What owl steals all kinds of poultry? 1404.
 What bird is called the raincrow? 485.
 What birds were supposed to breed in the halcyon days? 1004.
 How fast can an ostrich run? 1398.
 How many pounds of feathers are taken from an ostrich? 1398.
 How big is an ostrich egg? 1398.
 How much is a pair of ostriches worth? 1398.
 What is the best food for an ostrich? 1398.
 What large bird carries a helmet on its head? 347.
 What bird is also called the loon? 536.
 What birds have been killed in immense numbers to trim ladies' hats? 814.
 What birds are called sea swallows? 814.
 What is one of the handsomest of all birds? 1853.
 What birds do the Esquimaux use for clothing? 138.
 What bird never gets plump, no matter how much it eats? 868.
 What wonderfully beautiful bird has been a victim of woman's vanity? 869.
 What was the sacred ibis? 908.
 What is a bird of good omen? 1833.
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 What bird can swallow a kitten? 14.
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 What has happened to the golden plover? 1505.
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 What parrot in New Zealand will kill a sheep? 1425.
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 What is the most common June bird in California? 1426.
 What bird is called pheasant in the South? 807.
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What is the family name of the wild turkey? 1465.
 What bird seems to walk in the water? 1462.
 What birds do sailors call Mother Cary's chickens? 1462.
 What bird can outswim fish? 1444.
 What large bird eats snakes? 1716.
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 What is the largest of all song birds? 1128.
 How was the lodo exterminated? 538.
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 From what fish do we get isinglass? 1842.

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 What other native of the sea makes an inky fluid? 1713.
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 Is the "coon" related to the bear? 1577.
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What was the trotting record in 1818? 886.
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 What is a valuable English hog? 1857.
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 What bear marks a "keep off" sign on a tree in his hunting ground? 186.
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 What is the value of the silver fox skin? 703.
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 What is the American wild cat's right name? 348.
 What terrifying animal is really a coward? 1127.
 What is the lion's only enemy? 1078.
 Can a tiger defeat a lion in combat? 1911.
 What animal is called catamount, American panther and American lion? 1560.
 Are panthers different from leopards? 1056, 1417.
 What is the tiger of the New World? 955.
 Are there any wolves in South America? 2103.
 What is the jackal? 952.
 How is the walrus known? 2038.
 Does sealskin fur come from the seal or the sea lion? 1714.
 How do the hind legs of a seal differ from those of a sea lion? 1714.
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 What are the howling monkeys? 1252.
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 What is the chimpanzee? 388.
 What ape can travel six miles an hour among the tree branches? 1389.
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- Where do trees grow to be 500 ft. high? 1940.
 From what tree is the word "book" derived? 192.
 What tree is believed never to be struck by lightning? 193.
 What is one of our most valued timber-trees? 1367.
 What is the character of red oakwood? 1367.
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 Which is the strongest of oak trees? 1367.
 What oak wood is used in cooperage? 1367.
 What oak has evergreen leaves, and is used in shipbuilding? 1367.
 How many pounds of sugar will a maple tree yield? 1166.
 What is bird's-eye maple? 1166.
 What is one of the first trees to bloom in the spring? 1167.
 How is boxelder related to maples? 1166.
 What is black ash used for? 118.
 To what family does the elder tree belong? 594.
 Why is the white elm famous in history? 609.
 Is the pecan a hickory nut? 872.
 Does white poplar come from the poplar tree? 1528.
 What is the aspen tree? 1528.
 What is the sweet bay tree? 1147.
 What tree produces turpentine, rosin and tar? 1492.
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 What chestnut tree produces only one nut? 379.
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 What is the horse chestnut? 887.
 What wood was used for Egyptian mummy cases? 1858.
 When are butternuts used for pickles? 297.
 What is the plane tree mentioned in the Bible? 1858.
 What tree does red cedar come from? 354.
 What tree is the white cedar? 492.
 What is the cedar of Lebanon? 354.
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 What leaves does the German maid use on her wedding day? 1294.
 What wood is used for tool handles? 541.
 What is the national flower of Flanders? 149.
 How does hemlock compare with pine wood? 860.
 What is spruce-beer made from? 675.
 What is Mexican honey water? 26.
 What plant is called by mistake century plant? 25.
 On what tree does the cocoanut grow? 1412.
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 Where does vegetable ivory come from? 950, 1412.
 What is a common food article of the Arabs? 505.
 Where are Smyrna figs grown? 660.
 Describe the pomegranate fruit. 1523.
 Where are olives grown? 1379.
 How many bunches does a banana plant produce? 165.
 How is lemon extract obtained? 1052.
 Where is citron grown? 402.
 Why is the apple called the king of fruits? 85.
 To what family of plants does the apple belong? 85.
 What is the greatest apple country in the world? 85.
 Where does the apple thrive best? 85.
 For what is the common apple tree rightly valued? 85.
 Of what country is the peach a native? 1434.
 What fruits are related to the peach? 1434.
 What is the nectarine? 1434.
 How are peaches trained in England? 1434.
 In what months should peach trees be gone over? 1434.
 What two fruits are related to the pear? 1435.
 What place does the pear hold among orchard fruits? 1435.
 What is a pome? 1523.
 What plum is splashed with spots of red? 1506.

- What kind of cherries are cultivated for canning? 377.
- What is cherry blossom time in Japan? 377.
- What is the choke cherry? 377.
- What cherry tree is valuable for timber? 377.
- What are prunes? 1555.

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- How many species of grapes are there? 794.
- How many kinds of wild grapes are found in the U. S.? 794.
- What are the two principal products of grapes? 794.
- To what family does the grape fruit belong? 795.
- What is the pomelo and shaddock? 795.
- How does the blackberry differ from the raspberry? 222.
- What is the parent of the black raspberries? 1587.
- What black raspberries have purple flowers one and two inches in diameter? 1588.
- How are dewberries related to raspberries? 1588.
- What must house plants contend with? 890.
- Why is the kitchen a good place for plants? 890.
- When should plants be potted? 890.
- What is the best soil for most house plants? 890.
- What plants grow best in north windows? 890.
- What are the easiest plants to manage? 891.
- What is the most popular foliage plant? 891.
- What is the best time to plant hyacinths? 891.
- What is the most popular of flowers? 1633.
- What does horticulture include? 887.
- What is the general rule for pruning? 1555.
- What are dry fruits and fleshy fruits? 721.
- What city ships 5,000 carloads of raisins every year? 309.

PHILOSOPHY

- What is called the mother of sciences? 1471-2.
- What is the aim which philosophy always has in view? 1472.
- With whom is the history of philosophy said to commence? 1472.
- Into what three periods is the history of philosophy divided? 1472.
- What names mark the three periods of ancient philosophy? 1472.
- What is mediæval philosophy? 1472.
- Who are the founders of modern philosophy? 1472.
- Who was the greatest of all Greek philosophers? 97.
- What philosopher taught that pleasure is the chief good? 621.
- What philosopher, condemned to death, spent his last day discoursing on immortality? 1777.
- What philosopher left no written accounts of his teachings? 1777.
- What are the distinctive principles of the teaching of Socrates? 1502.
- What is Plato's theory of knowledge? 1503.
- What is education, according to Plato? 1503.
- What was Plato's highest idea in his view of philosophy? 1503.
- What are the four cardinal virtues? 1503.
- Who was the founder of the Italic school of philosophy? 1567.
- Who first assumed the title "philosopher"? 1567.

PHYSICS

- What does the science of physics deal with? 1481.
- What properties of matter are excluded in a narrow sense? 1482.
- When do we know a truth scientifically? 1706.
- What are the only two things in nature that have an objective existence? 692.
- What is the *moment of force* of a body? 692.
- How is the word *force* much abused in popular usage? 693.
- What is the study of *applied sciences*? 1482.
- What are the different branches of engineering? 614.
- What qualities are necessary for success in engineering? 615.

DYNAMICS

- What is the aim of the science of dynamics? 566.
- What is required in order to locate a particle? 566.
- What do we use to describe the change of position of bodies? 566.
- How is the velocity of a particle defined? 566.
- How is the unit of time measured? 1913.
- What is acceleration? 566.
- What is the science of motion called? 566.
- What is meant by *mass*? 566.
- What is the distinction between *mass* and *weight*? 1184
- What is meant by *inertia*? 566.
- How is inertia measured? 925.
- What are the three fundamental concepts of dynamics? 566.
- What experimental facts are at the foundation of dynamics? 566.
- What is the linear momentum of a body? 566.
- What is force? 566.
- What is the distinction between kinetics and statics? 1814.
- What is meant by graphical statics? 1814.
- What are Newton's laws of motion? 566.
- What is the conservation of matter as stated by Lavoisier? 567.
- What are *work* and *energy*? 567.
- What is the unit of power? 1541.
- What is the principle of the conservation of energy? 567.
- What simple method is used to treat rotation and translation? 567.
- What are the two groups of energy? 567.
- What is the definition of potential? 1537.
- Does the potential energy of any system tend to increase or to decrease? 567.
- What is elasticity? 593.
- What is meant by *stress* and *strain*? 594.
- Why is perpetual motion impossible? 1454.
- How is density defined? 521.
- What is specific gravity? 521.
- What is the hydrometer? 903.
- What is the science of hydraulics? 903.
- Under what pressure do hydraulic engines work? 903.
- How is the possible work of a water-wheel determined? 2053.
- What two kinds of water-wheels are used today? 2054.
- Where are the most powerful turbines ever built? 2054.
- What is the available water power of the United States? 2054.
- What horse power is developed at Niagara Falls? 1346.
- What two systems of waterworks are now in use? 2055.
- What is the daily consumption of water per person in American cities? 2055.
- How many times greater is this than the consumption of European cities? 2055.
- What is the temperature of boiling water? 1815, 237.
- Do pressure and temperature increase equally in a closed boiler? 1815.
- What are the two general types of boilers? 236.
- What is the Babcock and Wilcox boiler? 237.
- How is the horse-power of a boiler stated? 237.
- What percentage of carbon does coal contain? 413.
- What power was used to work the first piston engine? 1815.
- What lazy boy is said to have invented the valve gear? 1815.
- How did James Watt improve the steam engine? 1815.
- What is Watt's engine-governor? 788.
- What governor is used on modern high speed engines? 788.
- What variation in speed is allowed for electric light engines? 788.
- What is an indicator? 922.
- What information is given by indicator cards? 922.
- What is the difference between indicated horse-power and brake horse-power? 923.
- What is a prony brake? 570.
- What is meant by one horse-power? 569.
- Upon what does the efficiency of a steam engine depend? 1816.

- How does a condensing engine differ from a non-condensing engine? 1817.
 How does the Parson's turbine engine differ from De Laval's? 1953.
 Which of them makes 15,000 revolutions per minute? 1953.
 In what two ways only may the efficiency of a turbine engine be increased? 1953.
 Who invented the link motion used on locomotives? 1817.
 What locomotive showed a speed of 30 miles an hour in 1829? 1817.
 What is the steam-hammer? 1818.
 When and by whom was the screw propeller introduced? 1818.
 Who made a successful experimental boat in 1801 using a screw propeller? 1711.
 What ocean steamship uses 570 tons of coal per day? 1819.
 What study treats of the properties of gases? 1508.
 How was the first gas engine operated? 739.
 How does the gas engine compare with the steam engine in efficiency? 740.
 What gas motor has given the highest efficiency of any form of heat engine? 740.
 What is the pressure of the atmosphere? 33.
 What is the height of the atmosphere? 34.
 Who showed that "nature abhors a vacuum *because* the air has weight"? 174.
 What is the aneroid barometer? 174.
 How does a force pump differ from a vacuum pump? 34.
 What vacuum pump can reduce the pressure of a closed vessel to the one hundred millionth of an atmosphere? 35.
 What degree of vacuum can be produced with an ordinary air pump? 1997.
 At what temperature and what pressure will air become a liquid? 438.
 What two fluids result from liquefied air? 1078.
 What enormous pressure can liquid air exert during evaporation? 1079.
 What is the manometer used for? 1161.
 What fact is known as Boyle's law? 255.
 What fact is described by the law of Charles? 370.

ACOUSTICS.

- What subject is studied under acoustics? 8.
 What two things are essential to the production of sound? 8.
 How is the pitch of a string determined? 8.
 What is the *frequency* of a note? 1495.
 What evidence have we that sound is a wave motion in the air? 8.
 What is a wave motion? 2058.
 How did Newton use the echo to determine the speed of sound in air? 579.
 How may two sounds produce silence? 8.
 Does the pitch of a sound affect its speed? 8.
 How fast does sound travel in air? 8.
 How does sound help to determine the number of atoms in a molecule of gas? 8.
 What is the manometer flame used for? 1162.
 How does a "musical tone" differ from a "noise"? 8.
 What determines the *loudness*, the *pitch* and the *quality* of a musical tone? 9.
 What is a musical interval? 9.
 When are two notes in unison? 9.
 What is an octave? 9.
 What is a remarkable fact about the ears of all western nations? 9.
 What is the musical scale made up of? 9.

HEAT.

- What are the two fundamental questions regarding a thermal condition? 854.
 How does Maxwell define temperature? 855.
 When are bodies said to have equal temperatures? 1886.
 What are the essential features of a good thermometer? 1901.

What peculiar advantages has mercury for use in thermometers? 1901.
 How do the Fahrenheit and Centigrade thermometers differ? 1901.
 What other thermometer is also used? 1592.
 What is a pyrometer? 1567.
 Describe the two pyrometers now in use? 1567.
 What are the only two methods known for the transfer of heat? 855.
 Upon what four things does the flow of heat through a solid body depend? 855.
 How does *convection* differ from *conduction*? 855.
 What remarkable similarity exists between light and radiant heat? 855.
 What is radiant energy? 1579.
 How does heat differ from radiant energy? 1579.
 What instrument detects the radiation from a candle two miles away from it? 1580.
 What are the three most important effects of heat? 855.
 What is the coefficient of linear expansion? 855.
 How much does the volume of a solid change when heated? 855.
 What was the term *caloric* formerly used for? 311.
 How do ice and water use up heat in melting and evaporating? 856.
 How is the unit of heat defined? 856.
 What is the *specific heat* of a substance? 856.
 What is the *heat of fusion*? 856.
 What is meant by the vapor-tension of any substance? 636.
 What is sublimation? 636.
 How may the boiling point be defined? 636.
 What is distillation? 535.

LIGHT.

When does light travel in straight lines? 1067.
 What is the phenomenon of reflection? 1067.
 When is a ray of light said to be refracted? 1067.
 What is the index of refraction? 1067.
 Does light travel at the same rate of speed in all kinds of matter? 1068.
 When are two rays of light said to "interfere"? 1068.
 What did Newton prove regarding the composition of a ray of white light? 1068.
 If a ray of light is passed through a crystal of Iceland spar, what is the result? 1065.
 Why do we believe light to be a wave motion of the ether? 1068.

GRAVITATION.

What is gravitation? 796.
 When and by whom was this law discovered? 796.
 What are the three principal facts known concerning gravitation? 797.
 What is the name given to the summary of these laws? 797.
 What important inferences may be drawn from this law? 797.

ELASTICITY.

What is elasticity? 593.
 When are forces said to be in equilibrium? 593.
 What is the meaning of the terms "stress" and "strain"? 593.
 How is the elasticity of length measured? 593.
 How is the elasticity of volume computed? 594.
 How is the elasticity of shape found? 594.
 Which of these kinds of elasticity is employed in dividing bodies into solids and fluids? 594.
 When are bodies said to be rigid? 594.

ELECTRICITY.

How did the word "electricity" originate? 596.
 In 600 B. C. what facts were known concerning electricity? 596.
 During the next two thousand years, was any advance made in the science? 596.
 What is the science of electrostatics? 596.
 What is the first law of electrostatics? 596.
 What is a "conductor"? 596.
 What is a "non-conductor"? 596.
 What are the two kinds of electrification called? 596.

When do bodies attract and when do bodies repel each other? 596.
 What was the fourth great discovery in electricity? 596.
 What is the phenomenon of electrostatic induction? 597.
 When is a wire said to have an electric current running through it? 59.
 What is a galvanometer? 597.
 What is a voltaic cell? 597.
 What two features distinguish the storage cell from other voltaic cells?
 597.
 What is an induced current? 598.
 What is a thermo-electric current? 598.
 What is an ampere? 598.
 What is an ohm? 598.
 What is Ohm's law? 598-9.
 What is a volt? 599.

MAGNETISM.

What remarkable property has a magnet? 1145.
 What are the magnetic poles of a magnet? 1145.
 What is the fundamental principle of the compass? 1145.
 What is the magnetic declination? 1145.
 What important discovery did Bianco note in regard to this? 1145-6.
 What is the magnetic dip? 1146.
 Who was the first profound student of magnetism? 1146.
 What led him to believe that the earth is a magnet? 1146.
 When iron is heated red hot what is the effect on its magnetism? 1146.
 What is magnetic induction? 1146.
 What sort of combination is called an electromagnet? 1146.
 Of what important scientific instruments is this a fundamental part?
 1146.

PHYSIOGRAPHY

How is the term "physiography" used in England? 1482.
 How is the term used in America? 1482.
 What is its meaning when considered as the correlative of meteorology and of oceanography? 1482-3.
 How does it differ then from physical geography? 182.
 How is it related to geology? 1483.
 How does physiography come to include meteorology and oceanography? 1482.
 What are the three classes of processes that work on the earth's surface? 1483.
 What does diastrophism include? 1483.
 What does vulcanism include? 1483.
 What does gradation include? 1483.
 Where are the centers of these three activities? 1483.
 The transfer of material is usually between what levels? 1483.
 What are the greatest features of the earth's crust — both elevations and depressions? 1483.
 Is it known how these features originated? 1483.
 What is the continental shelf? 1483.
 What are some horizontal irregularities of the land? 1483.
 Of the ocean? 1483.
 In what different ways have these originated by diastrophism? 1483.
 By gradation? 1484.
 By vulcanism? 1484.
 What are the three great relief types of land? 1484.
 How do plateaus and plains differ from each other? 1484.
 What is implied by the term mountain? 1484.
 How did plains originate? 1484.
 How have their surfaces been modified? 1484.
 Of what are plateaus the result? 1484.
 Have they been similarly modified? 1485.
 What are the various ways in which mountains originated? 1485.
 What of their modification? 1485.
 How are valleys made, leaving hills? 1485.

- What are buttes? 1485.
 What are mesas? 1485.
 What are alluvial and lacustrine plains? 1485.
 When are slopes called cliffs? 1485.
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ANALYTICAL INDEX.

The purpose of the editors in the preparation of *The New Student's Reference Work* has been twofold—to give an accurate, up-to-date, and interesting treatment of all subjects of value to teachers, students, and general readers and to make readily available all such information. To complete the work so well begun in the choice and treatment of subjects and in the general arrangement of facts in the various articles, a complete analytical index has been prepared and will be found of the greatest assistance. The advantage of this Index may be briefly stated as follows:

(1) The selection of the subjects, which should be treated in separate articles, is the first task in the making of a reference work. Where a subject is not treated separately, however, information concerning it may be included in an article on another subject. At once it will be seen that without some means of locating such information much that is of value would be lost to the reader. Here the analytical index comes to his aid. An illustration of this point is found in the subject "Mosques" on Page 2477 of the Index. Here is a word of which the full meaning can be determined from any good dictionary. It is not, therefore, necessary to use space for that. There are, however, some important Mosques, the location of which is of value to the reader. These are all mentioned in other articles. By simply grouping in the Index the pages on which reference to "Mosques" is made all the information desired is obtained, needless repetition avoided, and space economized.

(2) There is a saving of time and needless annoyance by the use of the Index in being able to find the subject desired, irrespective of the title under which it is treated. For example, one may desire the biography of an author, but is only familiar with the pen name. Take for illustration "Marion Harland." In the text on Page 1892 the biography is given under the real name, "Mary Virginia Terhune." The Index, however, gives both names and proper page reference as follows:

Page 2455 of the index, *Harland, Marion*, (Mary Virginia Terhune): 1892.

Page 2505 of the index, Terhune, Mary Virginia (*Marion Harland*): 1892.

Thus one knowing the author under either the pseudonym or real name could find the biography as readily as though both names were known.

(3) An important feature is suggested by the references to "Agriculture," on Page 2414 of the Index. By use of this analytical arrangement one may quickly and with wonderful accuracy formulate a "brief" or an outline of any far-reaching subject such as this, and be fully prepared to take it before the school, to prepare a paper or talk, or to follow a course of reading as the occasion may require. To use "Agriculture" as an example: One would wish to consider first the "History of agriculture," and in that connection "Hebrew agriculture," "Medieval agriculture," "Modern agriculture," the development of the science in all the various countries named, "experiment stations," "colleges and schools," etc. Next would come soils, and in this connection "alluvium," "capilarity of soils," "chemistry," "distribution of crops," "rotation of crops," "nitro-gathering crops," etc. Next, one would probably want to classify the different branches of farming, as fruit raising referred to in "apples," "grafting," "spraying mixtures," etc.; and stock raising, "poultry," "stock breeding," "stock raising," "stock feeding," "veterinary science," and dairying, "butter," "creamery," "cream separator," "Babcock test," etc. The application of this principle to other subjects may be noted, as in the subject "Art," on Page 2418 of the Index.

(4) Noting carefully the foregoing, another advantage is brought into prominence, the ability on the part of the editors, through use of the Index, to condense their work, to eliminate repetition of facts and so classify subjects on which a great diversity of information is given, as to provide space for a number of highly important special articles and make the volumes a compact, convenient and usable library of reference. It may be stated that, in the opinion of the publishers, no such successful work in this line has ever before been undertaken.

It is the urgent advice of the publishers that reference be always made *first* to the Index. Even in finding subjects treated under familiar headings this is good counsel, for with the page in mind one may find the article in a fraction of the time needed to locate it by use of the alphabetical arrangement. When it is remembered that in some cases the subjects will be found not specifically treated in a separate article, in some treated under a title unfamiliar to the reader, and in many cases much added information of value on the subject will be found indicated in additional references, one can appreciate not only the Index as a feature of *The New Student's Reference Work*, but the wisdom of the advice here given.

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The pictures relating to any one subject, in addition to being indexed alphabetically, are also grouped under the subject headings. For example, all the full page illustrations pertaining to Physiology, in addition to being indexed under "Heart," "Brain," etc., are all brought together under "Physiology."

Geographical topics are not only classified under "Geography" and under the different continents and countries, but the headings "Agriculture," "Botany," "Geology," "Meteorology," and "Zoology," should be consulted.

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Helpful Suggestions on the Pleasant Art of Instructive Story Telling

Considerations of the Mechanics of Story Telling, with Illustration

Story telling is an ancient art handed down to us from the time when it was practically the only "school," the sole method of distributing knowledge. This ancient pleasure is being revived. It is the most pleasant way of instructing the young that we know. More and more our schools are adopting this method, and by it our young people are learning quickly and most willingly. A story, properly told, will give information and knowledge; it will also develop the imagination, assist in moral guidance, increase the vocabulary, and teach concentration.

Let us consider the subject matter. It is more inclusive than we believe, including not only fairy tales, but natural history, science, government; in fact, every subject known. The only rule to be observed is that, in the choice, the subject should be limited to one thing: Mr. Wasp, Franklin Flies a Kite, etc. Broad subject matter scatters the thought and fails to entertain.

As a second consideration, do not neglect the entertaining element, for only to the degree that a story holds interest will it likewise instruct; it must teach and entertain at the same time.

Action must be the keynote, even in the introduction; and immediate point of contact with the audience or child must be secured. For instance, if telling about the wasp, one may start with the insect in motion, and gain point of contact by showing the similarity between the buz-z of the wasp and the child's hoot, ho-ot as he rushes down the street on his velocipede. This point of contact is very important. A child often wishes to be the object itself: the engine and engineer combined; invariably he is interested in a subject only insofar as he may fit himself into it by imagination, by "pretending."

Actively continuing the story, a moral may be quietly included. For instance: "With all his buzzing, a wasp seldom bothers any one who doesn't bother it. We have city laws to protect our rights; the wasp carries his laws in his stinger. People know more than animals; we do not carry our laws in our fists, but have stopped fighting, and have good laws instead." This also contains a point of contact. So will the same personal touch be secured as we tell about the wasp's paper-making industry and home-building efforts.

As we proceed with our story, we must not forget our vocabulary. The child will then quickly learn correct usage of words by imitation—and a child is very imitative. One must not be stilted in manner and selection. The use of imitative sounds is graphic and laudable, but never indulge in "baby talk."

Humor is a saving grace, not only at the council tables of the great—as Lincoln so well illustrated—but in the schoolroom, the home, and the story. Oftentimes it may point a moral: "Baby wasps spend their lives in cocoons or blankets, and are fed by their older sisters. When an older sister feeds a baby, she flies up to it, waving her wings, and the baby opens its mouth to receive the food, at the same time giving its older sister a drop of sweet nectar from the end of its tongue. Then the older sister learns that if she merely flaps her wings the baby will offer the drop of nectar, and so she does this, without giving the baby any food in return. But the baby soon discovers this trick, and refuses to give nectar. Then the older sister grabs the baby, and chucks its head back in the blanket. The baby can not help giving nectar then; since every time its head is chucked back, it must open its mouth, and the sweet fluid rushes to the tip of its tongue. This process exercises the baby, and develops its muscles, just as work and play cause children's bodies to grow. But after a while the baby has no more sweet fluid, and the sister must feed it again. We can not expect others to lend us their playthings if we do not permit our brothers and sisters to use ours."

Several other principles must be kept in mind. The story teller must know the story thoroughly. She must take a great deal of interest in the story; one must never expect a child to take interest in anything that is presented to it in haphazard fashion. She must be natural and unaffected, or the child will think of her and not of the story. She must draw graphic pictures, and her facial expressions, motions, and word inflections must be lively and in sympathy with the incidents of the story. Finally, if she is before a group of young people she must watch her audience, and be possessed of a will to succeed.

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The articles in this department deal, in their historic order, with the various peoples who constitute our "America,"—where they came from, and our indebtedness to each for their contributions to our national life.

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The articles in this department are intended to teach the child the sacredness and the wonder of all life and its beginnings in seed and germ, and to prepare for a study of the related sciences in the higher grades by introducing him, in a simple and entertaining way, to the living world of plants and animals, starting with the simplest and passing, step by step, to the highest forms.

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NATURE STUDY

"Nature Study", in the modern school, emphasizes, first of all, the things which the child can investigate most readily—birds, insects, flowers and trees. The following articles take him through the entire year and deal with the most important features of familiar plants, trees and insects and all the common varieties of birds. The child's interest in nature is spontaneous, and through no other medium can his observation and reasoning powers be so easily developed.

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PICTURE VISITS TO THE GREAT INDUSTRIES

Every child has an instinctive interest in the great industries and how the wheels "go round." Familiarity with these processes is one of the most practical phases of Geography teaching in our schools, and the co-operation of the home, if supplied with appropriate material, is easy and desirable. Nine typical industries of special interest to children are graphically presented in this department.

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GOOD HEALTH AND OUR SOLDIERS OF PEACE

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SOLDIERS OF PEACE

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THE HOW AND WHY OF COMMON THINGS

The questions asked every day by children are now recognized as offering a unique opportunity for parent and teacher. *They are the child's own spontaneous expression of his desire to know.* He is hungry. Feed him. In this department are answered in a very entertaining style nearly 100 typical questions. The properties of Heat, Light, Sound, Electricity and other natural forces are explained, and the foundation laid for the study of Physiology, Acoustics, Astronomy, Chemistry, Physics and other sciences in the higher grades.

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HOW AND WHY OF ETIQUETTE

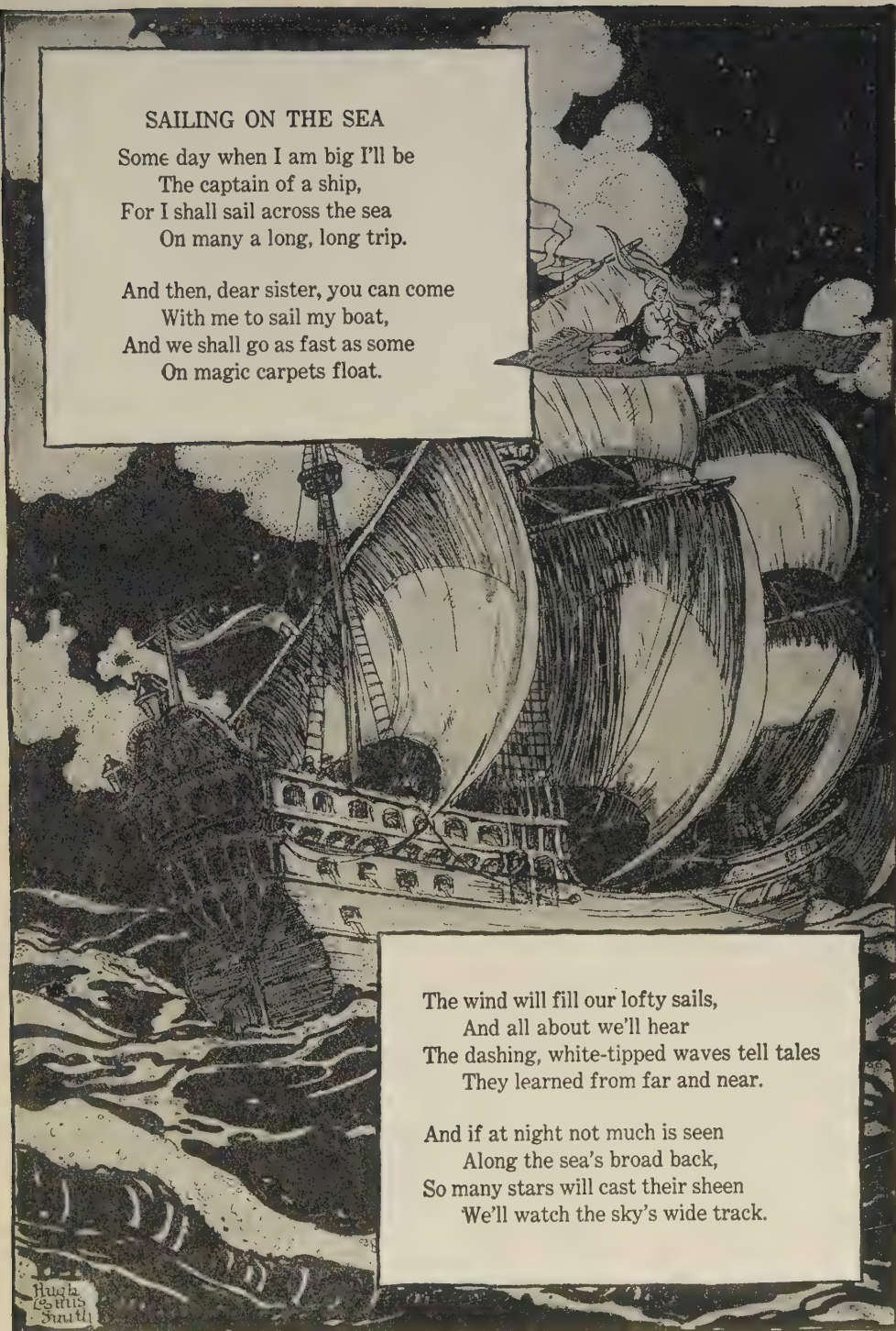
Dr. Eliot says the subject matter of this section is one of the most important parts of education. "Manners" and knowledge of certain social forms are no less valuable in "getting on" in one's life work. Lack of such information and training frequently explains why some succeed while others of equal or greater natural ability, fail. Self control, grace of bearing, ease of expression, the habit of drawing out the best in others—these things the world rightly regards as the real tests of education. Yet proper and sensible guidance is difficult to find.

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SAILING ON THE SEA

Some day when I am big I'll be
The captain of a ship,
For I shall sail across the sea
On many a long, long trip.

And then, dear sister, you can come
With me to sail my boat,
And we shall go as fast as some
On magic carpets float.



The wind will fill our lofty sails,
And all about we'll hear
The dashing, white-tipped waves tell tales
They learned from far and near.

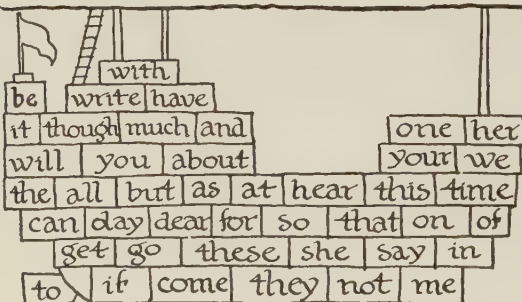
And if at night not much is seen
Along the sea's broad back,
So many stars will cast their sheen
We'll watch the sky's wide track.

The moon will light our dewy ship
 So that she'll shine her best,
 And when you feel your eyelids dip
 It's time to have a rest.

Then sometime we shall get to port
 Along a foreign strand,
 And children of a different sort
 Will say, "Stay in this land."

But though these children like our boat,
 We won't stay long on shore,
 And in the sand we'll write one note,
 "We're going home once more."

—L. N. R.



Note to Parents: It has been said that if the total number of words used in ordinary conversation were counted, one-fifth of the number would be composed of repetitions of nine words: *and, be, have, it, of, the, to, will, you*. It has also been said that these nine, together with thirty-four other words, are repeated so often that they are used half the time while speaking. The other thirty-four are: *about, all, as, at, but, can, come, day, dear, for, get, go, hear, if, in, me, much, not, on, say, she, so, that, these, they, thus, though, time, we, with, write, your, her, one*. Of course the speaking vocabulary of individuals varies greatly; but at the least, the words listed above are among the most basic in the language. The accompanying poem, *Sailing on the Sea*, contains all the words mentioned, and is an excellent one for you to use while teaching your children to read.

STORIES IN GEOGRAPHY

CHILDREN OF OUR OWN AND OTHER LANDS

EDITORS' NOTE TO MOTHER AND TEACHER.—The study of descriptive and political Geography is introduced into the very first year of school, through travel stories. The first interest that little children show in other people and lands, is in the way other children live, particularly those of primitive peoples like the Indians and Esquimos, and people whose ways of living are radically different from their own. Geography teaching now takes advantage of this curiosity, on the part of the children, to introduce them to the general study. In this way they get a knowledge of the physical appearance, manners and customs, climate, products and transportation of other peoples and countries, in addition to some history and physiography. The supplementary reading with the geographical aspect, supplied to the lower grades, is very wide and comprehensive. To cover all that is supplied, requires the purchase of a great number of little supplementary readers, each at a cost of from thirty to fifty cents.

This geographical department covers the most essential and attractive features of any one dozen supplementary readers, and has, besides, a unity of plan that none of the readers possess. The plan is to present primitive America, when it was inhabited only by the red child, then to bring the other children in, over the sea, in the chronological order of the colonization and settlement of the United States. The order followed here is the Indian, the English Puritan, the French, the Dutch and the Negro. The Esquimo peoples were visited very early by the New England whalers, and the Spanish colonists by trading vessels that went to Havana.

When once the sea-board was peopled, came the period of the hunter in Kentucky. There the experience of Daniel Boone is taken as typical. This paved the way for the pioneer of the Lincoln period. During this time there were large migrations of German and Irish peoples. The discovery of gold carries the settlement of the United States to the Pacific coast. The subsequent development of California, as it is today, follows.

Once having reached the Pacific coast, curiosity is led to take the world-round journey, to visit the children of the yellow and brown races, and the children of the Desert and the Alps. The world journey is logically completed by the return to the New York City of today, and a description of Castle Garden, where more than a million people of foreign lands are still entering America every year. This last feature is not to be found in any child's reader on the market.

The object, in these nineteen sketches, has been to present typical pictures of such facts as children are curious about, that will furnish a

complete image that they are likely to retain, and upon which they can build further knowledge. There is also the object of creating sympathy, and consequent breadth of mind. The travelled person is always a man of wider culture and sympathy, than is the same man if he should stay at home and never come in contact with any other mode of living or thought than that in which he was born. This creating of sympathy with other people is of extreme importance in a country like ours, which is constantly being recruited by foreign peoples. We are far too apt to under-rate these newcomers, and to think that we are offering them all and receiving nothing in return. As a matter of fact there are no people who come to us but have some gift or contribution that they can make to the general welfare and pleasure.



GEORGE DE FOREST BRUSH

THE WEAVER

Courtesy of Milch Galleries

Today Eagle Heart weaves blankets to sell to the Palefaces. As no design is made, he plans as he weaves. No two blankets are alike. Some colors he likes better than others. The next time you see an Indian blanket, try to pick out the colors. You will find dark blue, yellow, red, black, and white, as they are the favorite ones with the Indians.

Not all Indians were fierce and always fighting the White Men. The Navajos who are famous for the blankets they weave, are a peaceful, industrious nation, and, unlike other tribes, are increasing in number. They do not build lasting homes, but move as the pasturage and water supply for their herds change.

This picture is considered one of the best paintings of Indian life.

CHILDREN OF OUR OWN AND OTHER LANDS

I. THE RED CHILD OF THE FOREST

You are proud of being an American boy, aren't you? Perhaps you will be surprised to learn that there is another boy who has a better right to the name than you have. He was here four hundred years ago, when Columbus sailed over the wide ocean and found our country.

This American boy was tall and straight and slender. His eyes were as black as ink, his hair as black as a crow's wing. He could run like a deer, swim like a fish and climb like a squirrel. He was as solemn as a little owl. When he grew to a man he wore a head-dress of eagle feathers. His skin was not white like yours. It was very nearly the color of an English penny or an American one cent piece. Now you know what he was. He was an American Indian. There are still a good many Indians in our country. They live in houses, on big farms. They dress like white boys, speak English and go to school. But their faces are the same as those Columbus saw.

It was a hard, wild life the Indian boy lived. Still, he had a good deal of fun. It was like camping out all the time. There were four or five million Indians here, but the country was so big that there was room for everybody to move about a good deal. There were no cities or farms; no railway trains or wagons. The Indians had to travel on foot. They followed narrow paths, or trails, through the forests and over the plains. On the rivers and lakes they made long journeys, in boats so light that they could carry them on their shoulders from one stream to another. These boats they called canoes. They were made of birch bark stretched over frames of wood. A great many Indians travelled together, for company and for safety. Each band was called a tribe and each had a chief. When a tribe found a good place to camp, some poles were stuck in the ground in a circle. The top ends of these poles were tied together. Then the skins of wild animals, or mats woven of rushes were fastened over the poles. They called this tent a wigwam. Some Indians built dome-shaped

wigwams, like circus tents. Others built long houses of bark, big enough to shelter the tribe.

Our little Indian boy was born in a circus tent wigwam, in a village of other wigwams, in the forest. His mother put a long shirt of soft yellow deer skin on him, and taught him his first lesson before he was a day old. She taught him that he must not cry. When he cried she put her hand over his mouth. She did this because cruel enemies and wild animals might hear him. When he grew up he could bear any pain without complaining.

The Indian baby could not even kick. His mother bound him to a flat piece of birch bark, to make his back and legs straight. She hung "the baby and cradle and all" from her shoulders. She wrapped a big skin around herself and the baby, if it was cold weather, leaving his face uncovered so he could see. Then they went "by-by." Any baby would like that. When the tribe stopped to rest, the baby and his cradle were hung from the limb of a tree, and the wind rocked him to sleep.

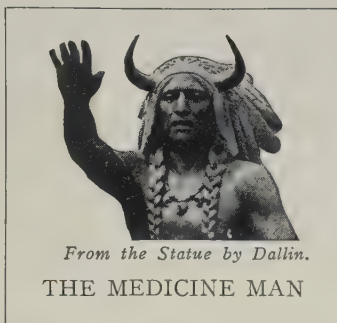
Someone was always saying "don't" to the Indian boy and girl. "Don't make a noise when you walk. You must not even rustle a leaf, or snap a twig." That might scare away the deer father was trying to kill, and then the family must go hungry. Sometimes, when out hunting, a boy had to lie for an hour, as quiet as pussy at a mouse hole. The Indian boy had to learn to strike fire from two pieces of flint; to make a bow and a stone arrow head; to make a canoe and snow shoes. He shot arrows at a mark every day; he speared fish, and threw stone hatchets. These hatchets were called tomahawks. He must be able to tell what kind of weather was coming, and learn to read the picture writing on the sign posts set up in the forests. He must learn the ways and places and calls of animals and birds, and be able to follow the tracks of men and wild beasts. He had to learn how to fight, too, or he and his family would be killed. The Indian boy was grown to a man before he had learned all his lessons.

One sign that he had grown up was that he was given a name. It was really a nickname, given for something he had done. This name he had to bear all his life, so he was very careful not to do anything foolish or cowardly. If he did something brave, and got such a name as Eagle Heart, he was so proud he couldn't sleep the first night. The Indian man was proud and brave and cunning. Sometimes he was cruel. No man could use him for a slave.

THE RED CHILD OF THE FOREST

PAST AND PRESENT

THE Indian medicine man thought he could cure disease by frightening away the evil spirits supposed to cause it, so he wore horns and other things to make him look savage. What is this medicine man wearing that used to belong to Brother Bear? Indians, when they live in wigwams, believe in medicine men, as Eagle Heart did, but most Indian children now go to school and know better. The two



From the Statue by Dallin.

THE MEDICINE MAN

center pictures show the boys and girls studying art and manual training at the Indian school at Carlisle, Pa. In the summer the boys and girls at Carlisle are allowed to work on neighboring farms where they can earn a little money and learn how farming is carried on. Our government has established a number of Indian schools and keeps them up at a cost of several million dollars a year.



"She hung the baby and cradle and all from her shoulders."



Some tribes wrap up their babies in buckskin bags.

These are wigwams like that in which Eagle Heart was born. They are made of the skins of wild animals.

If Eagle Heart's sister was a merry little maid she might be called Laughing Water. Isn't that a pretty name? Laughing Water had lessons to learn too. She had to help her mother take the skins from the wild animals the hunters brought home, and cut up and cook the meat. She had to help scrape the hair from deer skins with sharp clam shells, and rub and pull the skin until it was as soft as a kid glove. A needle she made of a fish bone; the thread of the leg tendons of the deer. Her thread was like our violin strings. It was very strong. Then she sewed the skins into shirts and leggings and moccasins and robes. She embroidered moccasins and belts with little shells, after boring holes through them; and she colored porcupine quills and pushed them in patterns through the soft yellow skin. She colored long eagle feathers and made a warrior head-dress for her father. She made herself necklaces of shells.

In the summer, the Indian women and girls dug holes in the fields, with pointed sticks or clam shells, and planted corn and beans, pumpkins and tobacco. Laughing Water had to gather the ripe corn, shell it, boil the grains in clay pots, dry them and pound them to meal in wooden bowls. She sifted the meal through a sieve she made of fine, tough grass. She wove baskets of reeds and grasses. If she had time she wove colored figures and lines in her pretty baskets. She made clay cooking pots and water jars, and she painted figures on them. One of the nicest things she did was to make candy. She made it by boiling the sweet sap of the maple tree. For her father, Laughing Water dried the broad tobacco leaves. He put these in a pipe with a stone bowl and a hollow reed stem, and smoked them.

In the evening the whole tribe sat around a big fire under the maple trees. The tired hunters smoked and talked of the hunt, or of battles. Old men and women told stories of long ago. The Indians had no books, but their old stories were not lost. Grandfathers and grandmothers told these hero tales to the children, and the children remembered the stories and told them to their grandchildren. Some day you must read "*Hiawatha*" and learn more about how the first American boy lived.

Eagle Heart and Laughing Water thought their home would always be as it was then. They did not know that little children with pale faces were coming to live among them.

See Plate "*Natives of North America*," Vol. I, page 60. Also see INDIANS, page 921; AZTEC, page 150; PUEBLOS, page 1559. Also in Index under INDIAN see numerous references.

II. THE LITTLE PALE FACES WHO CAME OVER THE SEA

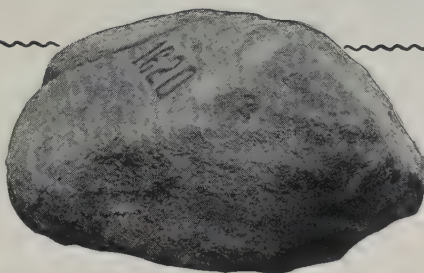
Six year old Faithful was knitting a stocking. Her home was a pretty stone cottage with a thick roof of straw. It was in a village, in England. Roses grew around the open door. Through the door she could see the square, gray tower of a stone church. Ivy climbed the tower. The bell in the tower rang sweet chimes. The church had pointed windows of many-colored glass. The fences between the cottages were thick green hedges. A mill stood beside a dancing river. The mill-wheel churned the water to foam. On a hill top stood a castle in miles of green park, with a stone wall around it. Lords and ladies lived there. Sometimes they drove to the church in a gay coach, or they went away to the King's court in London. They wore silks and laces and plumes and jewels. Little Faithful's English home was as pretty as a fairy story. But her father often talked of going away to the New World of America, that Columbus had found, to live. They were all safe and comfortable in England, but they were not happy. They dressed and lived more soberly than their neighbors. They liked to go to a plain meeting-house, instead of to the King's stone church. For this they were punished. Unkind people mocked them, and called them Puritans. But they were proud of that name because they tried to live pure lives.

Faithful wore a long, plain gown of dark wool. A square of white lawn was folded around her neck. On her head was a stiff white linen cap almost like a sunbonnet. Her little face was rosy and dimpled; her loving eyes as blue as violets. Her yellow hair just *would* curl, and that was a trouble. A little Puritan girl had to keep her hair smooth. She wore a white apron, with a pocket to hold her thimble and thread. The Puritans thought it wicked for even a little girl to be idle. Her brother Myles wore a wide-brimmed pointed hat, knee breeches and a tightly buttoned coat. He wore a wide, square-cornered white linen collar. Both of these children had big brass or silver buckles on their stout, low shoes.

One day their father said they must get ready to go to America. Other Puritan families were going with them in a sailing vessel. They had to take ever so many things with them, for they could not

SCENES IN THE PILGRIM STORY

PROTECTED BY
A GRANITE CAN-
OPY AND BY BARS
TO KEEP RELIC
HUNTERS FROM
CHIPPING IT
AWAY, THE ROCK
ON WHICH THE



PILGRIMS LANDED
STILL LIES AT
THE WATER'S
EDGE AT PLYM-
OUTH WITH THE
DATE OF THE
LANDING CARVED
UPON IT.



The Mayflower has just arrived and its passengers are landing on the "bleak New England shores."



The Pilgrims sadly watching the Mayflower as it sails back toward the comfortable homes in old England which they have given up for "freedom to worship God."



Even when they went to church the Pilgrims were obliged to go armed to protect themselves against attacks by the Indians.

buy even a paper of pins in America. They packed big chests with clothing and blankets and feather beds and table linen. Cooking pots and pewter dishes and candle sticks were put into barrels. The mother did not forget the spinning wheel and loom for weaving. The father thought of tools and seeds and guns and knives and fish nets. He put in a box of books, too. He did not take money. To trade with the Indians for furs, he took red blankets and calico and beads.

*One hundred Pilgrims stood on the deck of the Mayflower and said goodby to the green shores of England. Every one of them could do something useful. There were carpenters and shoemakers and blacksmiths and farmers. There was a soldier to lead them if they had to fight the Indians. A minister went with them, and a wise man to govern them. Puritan mothers could do nearly everything to make people comfortable. The little girls could knit and sew and mind the baby. The smallest boy could whittle wooden shoe pegs.

It was a long journey, in cold winter weather, over the sea. The Atlantic ocean is three thousand miles wide. Today we cross this ocean in steam-ships, in five days. But the Pilgrims came over three hundred years ago, in a little sailing vessel. The voyage took six weeks. Big waves beat the sides of the ship and rolled it almost over. The snow fell thick and ice covered the deck. Fogs shut them in, so they could not see where they were going. Icebergs as big as hills floated in the water, and they saw whales. By and by they saw sea gulls. They were near land.

The land was not green and pleasant like England. All they saw was black rocks, bare forests and great fields of snow. The Pilgrims got into little boats and rowed over foamy breakers to this land. They knelt on the rocks and prayed and sang hymns. And they named the bleak coast New England, after their old home.

How the trees fell in that forest! Twenty men with sharp axes chopped all day long. Soon the Pilgrims had warm log houses, with chimneys of clay and sticks. Doors of axe-hewn boards were hung on wooden hinges. Thick oiled paper covered the small holes left for windows, but there was plenty of light from the big fire of logs. The straightest logs were split and laid for floors. The carpenters made tables and stools and bedsteads. The blacksmith

* This first company who landed at Plymouth Rock, were called Pilgrims: those who came later and settled at Boston were known as Puritans.

swung long iron bars in the chimney to hang cooking pots over the fire. Everything was carried from the ship into the houses. Then the Mayflower sailed away home. The little pale faces were alone in the wide, wide, New World of America, with the red children of the forest.

They had a great deal to show each other. The Indians brought corn and told the white people how to make mush and hominy. They brought maple sugar to make syrup. They had very small grains of corn that burst into flowers when they got hot. Wasn't pop-corn a surprise? Faithful and her brother got fur hoods and mittens. They coasted on hillsides and ran on snow-shoes. They had baked Indian beans and pumpkin pudding to eat, and wild turkey with cranberries. In the summer they found wild grapes, plums and crabapples, strawberries, blackberries and blueberries. In the fall there were nuts of many kinds. They gathered wax bayberries to make sweet smelling candles. The carpenters made boats to fish for big cod. The children dug clams from the sand on the beach.

How cosy it was, in the log home in the evening! Half a tree could be put into the fireplace. The children ate their supper of hominy and syrup and deer meat from Indian bowls of wood. But they had white linen cloths and napkins. They brought their manners and their prayers and their school books to America. A woman taught them to read and write and spell and "cipher," in one of the cabins. To "cipher" is to do arithmetic sums by hard rules. They learned their letters from a horn book. The horn book was more like a slate than a book. Their only reader was the Bible. Faithful read the Bible through three times, before she was twelve years old. Besides she helped her mother. In America she had to learn to sweep a room clean with an Indian birch broom, and to brush the hearth with a turkey wing. She spun flax and wove cloth. She made soap by boiling lye water, dripped through wood ashes, and animal fat together. This made strong, brown soft soap.

Her brother went into the woods with his father to cut down trees. The forest land had to be cleared for fields, to grow corn and wheat and flax. Around every cabin was a little garden to grow peas and cabbages and flowers. Oh, how the children watched the first green sprouts come up. And how they clapped their hands when they saw the first English daisy or pink rose. The flowers made America seem more like a real home. In the fields and woods

were violets and buttercups, as in England. One tiny, sweet-smelling flower that pushed its pink, waxy clusters and glossy leaves right through the snow, in the pine woods, was strange to them. This they called the Mayflower, after their dear little sailing ship. Once in many months a sailing vessel came and brought them things from England. When it sailed away it took the furs of bears and beavers and foxes to sell in London.

Sometimes the Puritans and the Indians had dreadful battles. The red man wanted the forests for hunting, and the white man wanted the land for farms and towns. Every little settlement of white people had one big cabin that was both a meeting house and a fort. The men carried their guns and knives to church. They carried them when they went to the fields to plow. Sometimes they built high walls of pointed stakes around the village. After many years the Indians went deeper into the woods and left the country near the sea to the white people. The Puritans learned to love their home in New England. No one ever thought of going back to Old England. They had many little towns around a sea-port city called Boston.

Other English people who were different from the Puritans came to America, but Faithful and Myles never saw the little drab-gowned, soft-spoken, Quaker children who lived near the town of Philadelphia. Neither did they see the English children who lived in big houses by the wide rivers of Virginia. America was so big that the towns were hundreds of miles apart. Little Dutch children came to America to live, too, and French children and Spanish children, but they all lived so far from each other that they could not pay visits. We can go to see them today. Do you know how?

In the fairy story, when the Little Lame Prince, who was shut up in a tower, wanted to go to the land of Far Away or Long Ago he sat down on a magic carpet. Whisk! He sailed through the air as easily as a bird.

III. LITTLE WOODEN TWO SHOES

Let us follow the Mayflower as it sails back home. All the white children who came to America had to cross the Atlantic ocean. We won't stop when the ship comes to England. We will go farther over the sea.

Why, what is this? Trees growing on the edge of the ocean, and no land at all! Yes, here it is. The land lies behind the trees and lower than the water. Wouldn't you think the sea would roll in and drown the pretty red and yellow tulips in their beds? It would if the people had not built high banks of earth. These banks were called dykes. There were wide roads, bordered by trees, on top of the dykes. Crossing the low country were other wide, high dykes. Long troughs were scooped out of the tops of them, and sea water let in to make canals. Isn't it funny to see ships sailing on these canals, away above the church steeples? The towns and farms lay in deep, green bowls of land.

On the banks of the canals were windmills. The wind whirled the long, ladder-like arms. This turned big wheels in the wooden towers. Windmills ground flour and sawed wood and pumped water. The Dutch people built them in Holland where they lived. They made the wind do their hardest work. Weren't the Dutch clever people?

The people worked hard, too. Very early in the morning the men opened the shutters of the shop windows. The women scrubbed the door steps and swept the streets. Then they scrubbed the rosy faces of the children, put clean clothes on them and sent them to school. Their children, their houses, their neat brick towns, and even their farms, were so clean and bright that all Holland looked as if it was washed and ironed every day.

Clump, clump, clatter! Here comes blue-eyed Gretel in her wooden shoes, with little tow-headed brother Hans after her. Wooden shoes were good for many things. Hans sailed his on the canal, like boats. Gretel used hers for dolly cradles. At Christmas Santa Claus filled their shoes with sugar plums. Every Saturday Dutch children scrubbed their shoes with soap and water, until they were as white as little mother's kitchen table.



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"LITTLE WOODEN TWO SHOES" ABOUT TO EMBARK TO AMERICA

Hans wore wide knickerbockers, a tight jacket and a little round cap. Gretel wore six bright wool petticoats, all at once. Her close, gold-braided cap had big rosettes over the ears. They skated on the canals in winter. They went to a big city called Am-ster-dam, in an ice-boat, with a sail. The wind sent the boat flying over the ice.

Hans and Gretel came to America with other Dutch children. They lived on a long, narrow island in the mouth of the Hudson River. The island poked its blunt nose into the ocean, so ships could come up to it. It was higher than the water, so the Dutch did not have to build dykes. But they built a wall of stakes across the island to keep the Indians out. They built a windmill too. If there had not been lots of water the Dutch children would have been as lonesome in America as ducks in a meadow. The Dutch men were merchants. They bought furs of the Indians and sent them to Holland to be sold. When the ships came for furs they brought loads of bricks to build houses. A street of neat brick houses was built like the letter U around the blunt nose of the island. The fronts faced a green park; the gardens all ran down to the water. The Dutch called this town New Am-ster-dam. After many years English people came to live with the Dutch, and they named the town New York. Today nearly four million people live in New York. It is one of the biggest cities in the world.

The great-grand-children of Hans and Gretel had two homes. One was a brown stone house in the city. The other was far up on the high, rocky bank of the Hudson River. It had a porch with white pillars, and forests and meadows were around it. They had a gay coach and fast horses to drive into the city, and they had a sail boat on the river. They spoke English instead of Dutch, and they wore leather shoes with buckles. They were Americans. They never dreamed of such a thing as going back to Holland. See NEW YORK, page 1334.

IV. SHIP LOADS OF POLITENESS

Very near Holland lived other children who came to America. They were French. Their names were Louis and Jeanne. French people did not like to live alone, on separate farms. When the day's work in the fields was done, they liked to visit each other. So they lived in farm villages. The stone cottages and barns, the cow sheds and chicken yards, and the kitchen gardens of twenty families, were all mixed up together in the friendliest way. Tall, slim poplar trees grew in the door yards. On a rock-cliff, above the village, was a gray stone castle with many pointed towers. In French it was called a chateau (chat-ó). A noble lord lived there. He owned the farms and the village. Everybody had to pay rent to him. Farmers who went to America could own their land and houses.

When Louis and Jeanne said goodbye to their playmates their little faces were pale, their black eyes filled with tears. They kissed people, first on one cheek and then on the other. And they said: "Adieu, cher ami!" That was French for "goodby, dear friend, we will never see you again." French children were polite. Politeness means both kind feelings and pretty manners.

Louis and Jeanne came to America in one of a fleet of ships. On the big sailing vessel that led the fleet, was a company of the king's soldiers, in gay uniforms. They had a band of music. A white flag with golden lilies on it floated from the mast. The soldiers were going to build a fort. On the other ships were miners to dig for gold, workmen and farmers. There were noble lords and ladies too, and black-robed priests, and nuns to teach the children.

The French fleet sailed far south; south of Virginia, south of the rice and cotton fields. Then the ships turned west until they came to the wide mouth of the Miss'is-sip'pi River. Soon they passed a French town on the river bank. Its name was New Orleans. The fleet did not stop there. It sailed up the river hundreds of miles. The fort was built of lime stone from the high bluff that ran along the wide, brown flood of the Miss'is-sip'pi.

Cannon were set up on the walls. Soldiers watched by the cannon. They did not watch for Indians. The Indians and the

French were good friends. They were friendly because the French were so polite. Louis called Eagle Heart his "wild brother." Jeanne kissed Laughing Water on both cheeks, and gave her a red ribbon for her hair. The soldiers in the fort watched the Spanish people who lived on the western bank of the Miss'is-sip'pi. The French and the Spanish people both claimed the big river, and they quarrelled about it. They did not need to. There was plenty of room for both.

In the shelter of the fort the farm village was built. The houses were not made of stone, as in France, but of squared logs, set on end and the cracks filled with plaster. The roofs sloped out over porches. Above the porches dormer windows jutted from the sloping roof. Roses and honeysuckles climbed the porches. There were cherry trees and peas in the garden, and tall slim poplar trees in the dooryards. In the evening there was gay talk and dancing. On St. John's eve, in June, a bonfire was built. They could see other bonfires, of other French villages, along the river. This was a part of New France in America.

The French built forts and towns on the St. Lawrence River, far to the north of the Puritans, in Canada. They called two of these towns Que-bec and Mon-tre-al. They built Detroit and other places on the Great Lakes. All along the waterways, far in the deep heart of America, you can today find places the French people named after their kings and saints. But the French soldiers went back to France long ago, and the forts crumbled. The French farmers and traders stayed in America.

Louis and Jeanne learned to speak English, but they did not forget French. Today, thousands of people in Canada speak both English and French. Our warm, southern city of New Orleans is almost as French as many cities in France. If you should ever go to New Orleans you might come to know some pale, black-eyed, polite French children. When you go away they will kiss you on both cheeks, and say goodbye. But sometimes they seem to forget that they are Americans. Then they say: "Adieu, cher ami."

V. LITTLE FRIENDS IN FURS

Before they came to America to live, the English and Dutch people were great sailors and traders. If they heard of anything they wanted, in far-away lands, they sailed away in stout ships to get it. As soon as they had a few seaport towns in America, they built sailing vessels. They needed some things that they could not buy in England and Holland.

They needed oil for lamps. They had no gas. They had no electric lights that you turn on with little black buttons. They did not even have kerosene oil. They had only candles of tallow and wax, and not enough of those. In one place there was plenty of oil. Strong, brave men could go and get it without paying money. It was in the ocean. Would you ever think of looking for oil in the water?

The oil ships sailed north into cold, dark, stormy seas. Even in summer icebergs were all around them. The sun shone, day and night. It went 'round and 'round the sky in wide circles. Polar bears were on the ice. Swimming, yellow seal barked like dogs. Walrus showed their ivory tusks. Millions of eider ducks nested on the rocky shores. Whales spouted water when they came up to breathe. The oil ships had come for the whales. Under its rubbery skin the whale was wrapped in a thick blanket of fat. When it was melted this whale blubber made good oil for lamps.

The whaling ships had to hurry to get back home before winter. In the far north it was night all the time, in the winter. The sun did not shine at all. The ocean froze over. Sometimes the sailors staid too long and their ships froze fast, in the ice.

When this happened the sailors had to go on the land to live. The land was all ice and snow too, but there were people and warm houses. A village looked very queer. It was only a lot of dome-shaped mounds of snow. Rough dogs ran from low holes in the snow huts. They made such a noise that little furry heads popped out of the holes, too. If it had not been for their fat, human faces, the sailors might have thought these children were polar bear cubs. They were Es-qui-mos, a kind of small, brown Indians. They were good-natured and friendly. It was so cold that they had to wear the skins of animals. They had soft, warm stockings of eider duck

LIFE AMONG THE ESQUIMOS

IT SEEMS odd to think of Esquimos jumping the rope, but this is one of their forms of amusement. As you see, it is not the children alone that enjoy it. Below is shown the inside of an Esquimo hut. Isn't that a queer doorway? Perhaps this man is coming home to a meal. What do you think about it? In summer these huts melt and are replaced by others of earth or hides, like those in the next illustration.



In building these huts a circle is first traced, then slabs of packed snow are laid around this circle and a house built in the shape of half a globe—something like the sugar bowl hut of the children that live in the "Zoo."



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Summer camp of a very interesting tribe of Esquimos living in North Greenland.

skin, with the down inside. Their polar bear skin jumpers had hoods. Their high boots were of reindeer skin. Es-qui-mo children were as warm and brown and greasy as buttered toast.

The children showed the white visitors the way into the house. They stooped at the low hole and slid down a toboggan tunnel. They climbed into the middle of the house through a cellar door in the floor. This was a clever way to let people in and keep the wind out, wasn't it? The house was built in a pit, of drift wood. Wrecked ships and uprooted trees floated to them from far-away lands. The frame work was covered with sod and moss. Snow fell thick on the house and froze solid.

An Es-qui-mo house had no windows, not even a hole for the smoke to go out. A bench around the wall made a table, a bed, and seats for just as many men, women, babies and dogs as could crowd into the hut. They could hardly see each other for the smoke. The hut was warmed and lighted by earthen lamps that hung from the ceiling. These had moss wicks and burned walrus fat. Over the lamps meat was cooked in earthen pots.

Ice-bound sailors often had to live with the Es-qui-mos all winter. They went hunting with the men. The stout dogs pulled the hunters on sleds made of animal bones. They killed seal and walrus and bears, with long spears called harpoons. It was not as dark as you would think. The stars and moon shone on a white, frozen world. Sometimes there were lights brighter than our sun-sets; more wonderful than Fourth of July fire-works. They played all around the midnight sky in colored flames. They formed columns and crowns, curtains and banners. Ask mama to turn back to Volume I, page 140, and read to you about the *Aurora Borealis*.

When the sun came back and the ice broke up, the whalers went home with a ship load of oil in barrels. Their friends thought they were lost in the icy seas. When they were old men they sat in the bright light of whale-oil lamps and told stories of their adventures. The white children never grew tired of hearing about Agh-a-ni-to and Ny-ack, who lived in a snow house and dressed like polar bears. See *ESKIMO*, page 626.

VI. CHILDREN FROM SPAIN

Other ships sailed away for sugar. They found sugar right here in the New World. When Columbus came across the sea, before any other white man, he came in a Spanish ship. He found warm islands and the mainland, far south of where the English and Dutch people afterwards came to live. Spanish people followed him. They were glad to find that sugar cane would grow in many parts of tropical America. Sugar was worth a great deal of money. Do you know, no one, not even kings, had enough sugar to eat until shiploads of it were sent to the Old World from America?

Puritan and Dutch and Quaker lads often went as cabin boys, on the ships that sailed to the Spanish colonies for sugar. The farther south the ships sailed, the warmer it grew. The sun was high and bright; the sea and sky very blue. A steady wind blew all day long and filled the white sails. They passed dozens of green islands. On the islands were palm trees. One of the most beautiful things in the world is a palm tree, with a crown of green plumes, on the hill top of an island, against a blue sky. What would you think, then, of an island that was seven hundred miles long, and more than a hundred miles wide, lying in a sea as blue as indigo, and all its hill tops plumed with twenty-five kinds of palm trees?

"O-o-o-o-h!" is what the cabin boys on the sailing vessels said, when they saw Cuba. It was such a big island! It was so lovely, so green, so rich in fruits and other food plants. It had such wide harbors for ships, and it lay among smaller islands, right where all the ships would have to pass to go to lands beyond. No wonder the Spanish people called Cuba "The Pearl." No wonder they built their finest city in America, on the widest harbor of this jewel of an island. This city they named Havana. It was one hundred years old when the English and Dutch came to America to live.

To get to Havana a trading ship had to run the flag of its country up the mast. Then it sailed through a narrow passage into the harbor. The city was guarded by castle forts. It had a high wall around it. Over the wall, church towers and palm trees and roofs of red tile could be seen. It looked like some old Spanish city sleeping in the sun. Perhaps a Spanish merchant, in white

cotton clothes and a palm-leaf hat, invited the captain and the cabin boy to his home for breakfast.

Inside the walls of the city were low, one and two storied houses. They were colored pink and blue and lemon yellow. They were roofed with fluted red tiles from Spain. The streets were narrow. There was a public square, a palace for the royal governor, and a cathedral where ladies went to church. They wore black gowns, and shawls of black lace on their heads. In the house they wore white or gaily colored silk.

Juan (Wan) and Dolores (Dol'o-rees) ate their breakfast in the patio. The patio was the inside garden of a Spanish house. The house was built all around it. The patio was paved with marble. It was open to the blue sky. There was a fountain in it. Palms and pink oleanders, and orange trees with white blossoms and golden fruit, grew in tubs. It was cool and quiet.

The children were cool and quiet, too. They wore white cotton clothes, and sandals without stockings. They had soft black eyes and pale, cream-tinted faces. They were very polite, but rather lazy. Negro slaves waited on them. They ate oranges and bananas and pineapples. They drank chocolate and cocoanut milk. They gave their visitors salted olives and sugary raisins from Spain. If a visitor admired anything they said: "Take it, señor; it is yours." But unless it was some trifle he was not expected to take it.

These Spanish children were rich—oh, very rich. Their father had been to Mexico, or Central America, or South America. He went with Spanish soldiers who had guns and swords and cannon. They found Indians who were different from those in the north. These Indians had built cities and palaces and temples. Some of them had built stone roads over mountains and deserts. They worked the mines, and had treasures of gold and silver. But they had no guns or cannon. The Spanish soldiers killed the strong men, and made slaves of the children. They made these slaves go into the mines for more gold and silver. Most of them died. Ship loads of wealth were sent back to Spain. Rich Spaniards went back, too. Only some poor soldiers, and black slaves and dying Indians stayed behind, to build towns and make farms. After the gold and silver was all taken away, the Spanish king still kept soldiers and officers in Havana and other towns. He made all these poor people pay taxes. It was four hundred years before all these Spanish countries in America won their freedom from Spain. One of the

big Spanish islands belongs to us, today. It is called Porto Rico. It is near Cuba, and very much like it, but smaller.

Cuba, "The Pearl" of all the islands, is free today, and our country watches over it so no big nation can steal it. You can go to Havana in a fast steamship. The castle-like forts are still there, guarding the harbor. The harbor is full of ships that come for sugar, tobacco and coffee berries, oranges, bananas and pine-apples and many other good things to eat. The president of Cuba lives now in the palace of the old royal governors. In the cathedral you must take off your hats. It is a church, and besides Columbus is buried there. His bones were brought from Spain to the New World he discovered. Don't you think that was right? White people and negroes, and even a few Indians live in Cuba. They are all free, now, and they all speak Spanish. The low houses under the palm trees are roofed with red tiles; the walls are painted pink and blue and lemon yellow. The little children eat their breakfast in the patio. If you admire anything that belongs to them they will bow politely and say:

"Take it, señor; it is yours." If the gift should be a little cage full of fire-flies I would take it. It would make a pretty lantern to flash and glow in the orange tree in the patio. See CUBA, page 485, and HAVANA, page 847.

VII. THE LITTLE BLACK CHILDREN WHO LIVED IN A "ZOO"

It was noon but the little boys and girls were all asleep, in the huts under the palm trees. No, they were not *still* asleep. They had got up with the sun, but when the sun was high and hot they went to bed again. Their fathers and mothers were asleep too.

The huts were as round as big sugar bowls. You might think there was sugar inside of them from the swarms of ants and flies. The walls of the huts were made of bark, the cone-shaped roofs of long palm leaves. The trees and the river seemed to be asleep, and the comical monkeys in the trees, and the ugly crocodiles in the river. The leaves were wilted by the heat. Among the drooping leaves hung cocoanuts as big as baby brother's head, and bunches of fat, yellow bananas. By and by a shower of rain fell and cooled the air. The rain was like the kiss of the prince in "Sleeping Beauty." The crocodiles yawned, the monkeys chattered, little black heads popped from the doors of the huts. Then the whole village of people tumbled out of doors.

Such funny little boys and girls! You would have laughed to see them, and they would have laughed to see you. They were as happy as kittens and laughed at everything. They were black all over. That was easily seen for they had no clothes on at all. They had big, black eyes with very white rims. Their teeth were as white as ivory, and their hair curled tight to their heads in little knots. They laughed and cried and talked and screamed. They were as noisy as the monkeys in the trees. They were negro children. Their home was in the hot jungle of a far away country called Africa.

Every child had his breakfast in his hands. Some had bread made from the flour of the manioc root. They all had baked yams, a kind of sweet potato; and ground nuts, something like our peanuts. The babies sucked sugar cane. Maybe some of them had eggs, for there were little speckled Guinea chickens in the village. They drank from long-handled gourds, and from cocoanut shells. They were as fat as little butter balls.

These children could not swim in the river, for the crocodiles would bite them in two. They did not wash their faces. When they had put bracelets of iron and copper and ivory on their arms

and ankies; strings of bright feathers, colored bone beads and crocodile teeth on their necks, they were dressed. The boys had aprons or capes of spotted leopard skin that they wore when they went with the men to hunt elephants and other animals. They carried spears and vine ropes and big baskets. Some went in palm-tree boats to hunt other animals that lived in the river.

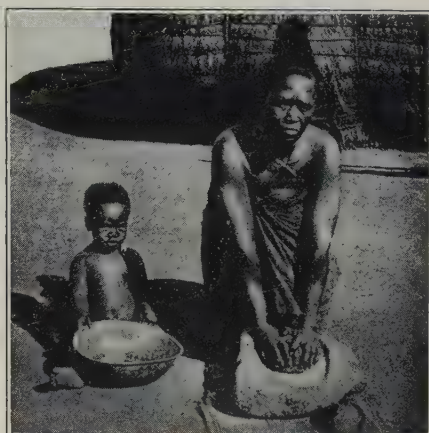
The women and girls planted yams and ground nuts in the fields. Slaves helped them. These slaves were black people like themselves, who had been captured in battle. The women made cooking pots of clay. They wove baskets and water jugs of reeds. Water jugs were woven very close, and the cracks filled with gum from trees, so they could not leak. Negroes did not have to work as hard as Indians, but they were always in danger of being carried away for slaves.

In the evening the hunters came home with elephant tusks and baskets of meat. Perhaps it was the flesh of the hippopotamus, a big water pig. Perhaps—why, it might have been almost any kind of wild beast! Lions and tigers and leopards; elephants and rhinoceroses and giraffes; striped zebras and swift antelopes, and gorillas, or man monkeys with long hairy arms, and many more queer animals live in Africa. You can see them in cages in a menagerie, or in the park zoo, today. Most of them are as terrible as their names. They did not often come into the villages, for they were afraid of the spears and traps.

One noon-time, when everyone was sound asleep, a band of painted black warriors stole into this village and made all the people prisoners. Men and women and little children had to march along the river bank. The river grew wider, and marshy plains lay along the banks. After the plains was white sand, and miles of blue water with foam caps on the waves. The black children screamed with fright. They had never seen the ocean before. They were frightened again when a ship with white wings sailed into the river mouth. Worst of all they were driven into the darkest part of the ship, under the deck, by strange looking white men.

Two hundred years ago black people were sold as slaves in many countries. Few people thought this was wrong. Ship loads of negroes were brought to America. The good Puritans bought some of them, and the gentle Quakers. Most of the slaves were sold in parts of America where it was warmer than in New England.

IN THE BLACK CHILD'S HOME



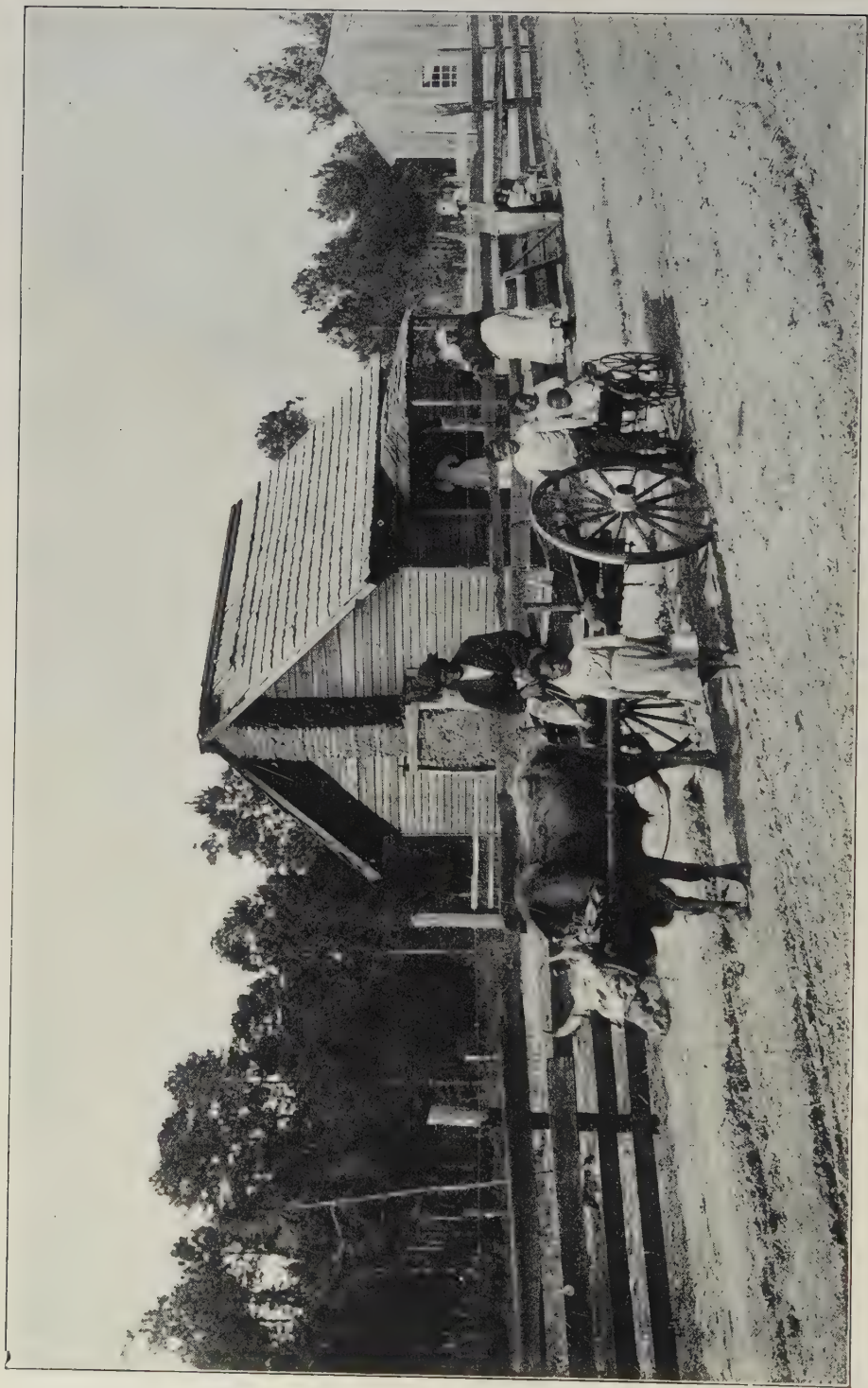
Among all nations before mills are introduced, people must crush their own grain before they can bake it. In Africa they do this in mortars with big pestles.



On the left is a group of African natives on the Zambesi river, and beside them a band of Zulus, a people who are particularly troublesome when on the warpath.



You can guess from its name what animal is fond of the fruit of this giant monkey-bread tree. Compare it with the slender palm trees on the right and the huts there shown with the one back of the Zulu warriors.



A HAPPY NEGRO FAMILY IN ALABAMA.

Virginia was warm and green like England. Many English people who came to live there were richer than the Puritans. They had large farms called plantations, and lived in big houses with white porches. Velvet lawns shaded by trees sloped to rippling rivers. Tobacco could be grown there, and that was worth much money in London. Slaves were bought to work in the tobacco fields.

The negro slaves lived near the master's house, in a village of log cabins. Calico dresses were given to the women and trousers to the men. The children had loose, short-sleeved shirts of tow linen. They slept in beds now, and sat on chairs and ate from tables. Everything was strange to them, even the way the white people talked. A boy or girl who learned quickly was taken from the field into the house. A little black boy might be called Sambo, a little girl Topsy. The negroes were not proud and brave like the Indians, nor were they cruel. They were never envious and hateful. The black "mammy" loved the little white baby she nursed. Sambo liked to catch the horses and ride with Master Roger. And Topsy liked to iron pretty dresses, to make frosted cake, and to powder and puff Mistress Evelyn's hair, lace her rosy-flowered gown and buckle her satin slippers when she went to a ball.

Many slaves were sold farther south than Virginia. They toiled in rice and cotton fields, cut sugar cane and picked coffee berries. You remember how the black children were always laughing and talking in the village of palm huts? Even after they became slaves in America they were happy, if they were warm and well-fed, and had kind masters who did not make them work too hard. On the plantations, in the evening, they talked and danced, and played on drums and bone rattles and banjos. Negroes have as sweet voices for singing as any people in the world. Sometimes the master's family, sitting in the moonlight, stopped talking to listen to the negroes singing. Perhaps your mother or big sister knows some of these negro songs. Today we love to sing "My Old Kentucky Home," "Old Black Joe," "'Way Down Upon the Suwanee River," and many other pretty negro songs.

The negroes were slaves in America for two hundred years. Then they were all set free. None of them want to go back to Africa, to the old wild life. They want to stay here and live like white people and send their children to school. They are Americans, too. They call themselves Afro-Americans.

VIII. BABES IN THE WOODS

Once they got started, people kept coming and coming and coming to America as if they never would stop! In our own part of North America, that is now the United States, three million people were living a hundred and fifty years after the Puritans came. There were many thousands of negro slaves. Most of the white people were English. We owned all the land from the Atlantic ocean to the Mississippi River. This land was fifteen hundred miles long and a thousand miles wide. But all those three million people lived on a narrow strip of land along the sea coast. They began to feel crowded.

Why didn't they move back from the sea, and spread over the land? They couldn't. There was a wall. It was a wide, high, double wall of mountain ranges. The wall was nearly straight, but the seacoast bent in and out. Here the land ran away out into the water. There the water took a big bite out of the land. So in some places the seacoast land was more than a hundred miles wide. In others it was much narrower. The Indians were pushed and pushed back by the white people. At last they went over the mountain wall. They went by a trail that the white men could not find for a long time.

White men lived far up on the mountain slopes. The land there was rough, rocky hills. It was not good for growing corn and wheat. Men had to hunt like Indians to get enough to eat. They were strong and brave and hardy. They could do everything the Indians did. Much of the time they lived in the woods. While in the mountains back of the Virginia plantations, a party of white hunters found the Indian trail over the wall. It was through a high, narrow valley. The Cum-ber-land River started there, in mountain springs. It cut a deep pass through which men could ride on horseback. The pass was called Cum-ber-land Gap.

These daring hunters went through the Gap and down the Western slope. They built no fire. They kept their food pouches filled, their moccasins tied to their guns. They rolled in blankets at night, and slept on their guns. They thought the Indians might see them. On the least alarm they slipped into the deep woods. One morning they saw a park-like country at their feet. There

were miles and miles of green meadows, with bright rivers and giant trees. The park was full of deer and other game.

The white men made up their minds to stay in this fair wilderness. They built some cabins inside a log fort. More men, and a few women and children were hurried over the Gap, and into the rude fort. A white baby was born there. There was even a wedding in the fort. Then began a life of daring and danger of many years. The earliest Puritans had not lived so hard a life as these hunters in Kentucky and Tennessee. They were hundreds of miles from the French towns on the Mississippi. The mountain wall was behind them. Ships could not come to them. They could neither buy nor sell anything.

Some years they dared not go outside the forts to grow corn. The men slipped out to hunt. Sometimes they did not come back. The Indians followed them and killed them. Sometimes painted red warriors danced around a fort. Very little boys had to learn to shoot, to protect their mothers and sisters. But more white people came. A hundred came for every one killed. They found another trail over the mountains to the Ohio River. They came down this river in keel boats. The Indians shot at them from the banks. Fleets of canoes followed the keel boats. Then soldiers came and fought battles with the Indians, so white people could live in that country. At last, after thirty-five years, there were little log towns and lonely cabins, scattered all through Kentucky and Tennessee.

Daniel Boone was one of the hunters who built the first forts. Find the story about him. Then we will tell you the story of a boy who was born when Daniel Boone was more than seventy years old. He was born in one of the lonely cabins in the woods of Kentucky. That was one hundred years ago. We will learn how he lived, what he did, and what kind of a man he became.

IX. PIONEER DAYS AND WAYS

It was a cold morning in mid-winter, one hundred years ago. Around the little log cabin the snow lay deep among the stumps of trees in the clearing. A zig-zag fence of rails was around the field and the cabin. Blue smoke rose from the chimney of sticks and clay. You could easily have gone into the cabin because there was no door. A buffalo robe was hung before the doorway for a curtain. Wild beasts from the forest—bears and wolves and wild-cats—could have gone in, too, but wild animals will not go near a fire. A big fire of logs burned in the fire-place.

What a wretched place to live! It was not much better than an Indian wigwam. The fire was the only splendid thing in the cabin. No, another beautiful thing was there. It was a pale young mother with a new baby. They lay on a bed of corn husks. It was raised from the floor on a frame work of poles. Over the mother and baby was a bear skin to keep them warm. The mother was not strong, but she was brave and sweet. She was glad the baby boy was big and strong, for he would have to work hard.

Presently, they had a visitor. It was a ten year old boy. His cheeks were red with the cold, and he was out of breath. He had run two miles, through the woods, to see the new baby. There were more wild-cats than babies in the woods of Kentucky. Besides, this baby was his cousin. He said that he was "tickled to death" to have a boy cousin. The boy was dressed in yellow deer-skin like an Indian. He wore moccasins, and a coon-skin cap with the tail hanging to his neck. A woman came and dressed the baby in yellow flannel and tow linen. She cooked some hominy and deer meat. She stewed some dried blackberries in wild honey. Then she went back to her own cabin, miles away through the woods. The boy stayed. At night he rolled up in a bear skin and slept by the fire place. The father went hunting so they could all have food.

Little boys had to grow up very fast in the back woods of Kentucky. When this baby was five years old he could catch fish, set traps for rabbits, get wood for his mother, and drop corn in the furrows, behind his father's plow. He went on coon hunts with men and dogs. He followed flying bees and found their honey in hollow trees. His father was a good carpenter, but nobody had



EMIGRANTS MOVING WEST IN COVERED WAGONS, OFTEN CALLED PRAIRIE SCHOONERS.

money to pay for carpenter work. He had to hunt, and fish, and grow corn, and chop trees and burn stumps. He had no time to put a floor in his cabin. The land was too poor to grow much corn. When the boy was eight years old the father said they must move a hundred miles away to get a better farm.

The mother packed everything that was worth taking with them, on the backs of two horses. The family walked. The big cousin drove a cow. The father carried a gun and shot game for their supper. When they came to the Ohio River they made a big raft of logs for a flat-boat. Even the horses and the cow went on the raft. The men pushed it across with long poles. The water was too wide and deep for the horses to swim. Then they were in a new state called Indiana.

They built a pole shack in the woods. A pole shack was a shed, open on one side. It wasn't nearly as good as a wigwam. The fire was outside. They lived in the shack a year. The boy was only nine, when the mother died, just as they got a good cabin built. Little, tired, wildwood lady! That life was too hard for her.

The boy helped his father and cousin saw boards from a green log to make a coffin. He whittled pegs to fasten the boards together. They had no nails. They buried the mother under maple trees, near where the deer came down to drink. The boy never forgot how his mother died. As long as he lived his eyes were sad, his lips tender. He pitied and loved and helped everything weak and helpless.

That lonely winter he studied his spelling book. His mother had told him that his grandfather came from good people in Virginia. She taught him to read and write. She told him he must study. By and by, a good stepmother came. She had three children so it was not so lonely in the cabin. She had a wagon load of tables and beds and chairs and blankets and dishes. She had a spinning wheel and a loom. The stepmother was a strong, kind, clever woman, who made everyone comfortable and happy. She found out that the boy loved books, and she helped him all she could.

He walked twenty miles to borrow a big law book. His cousin gave him a book of fables. He split cord wood to buy a little Life of Washington. He kept a book in the bosom of his checked shirt. At noon he sat under a tree and read a book, as he ate a dry, hard, corn dodger for his dinner. In the nearest village, he read a newspaper in a log store. When he grew up he knew more than any

man in the country. He could do more work, too, for he was tall and strong. He would not quarrel, and he made other men stop fighting. Everyone laughed at his funny stories. They wondered at his wise talk. He was so honest that he was called "Honest Abe." Now you know who he was. He was our great president, Abraham Lincoln.

Lincoln wanted to see the world. He went down the Ohio River, and on down the Mississippi River. He had no money for travelling. He went as a deck hand on a river boat. He saw the towns along the rivers, and the big, warm, French city of New Orleans. For a long time he thought he would learn to be a pilot, to guide boats safely on the big river.

When he was twenty-one Lincoln's father moved again. They went west into Illinois. They moved in covered wagons drawn by oxen. They drove for two hundred miles, through woods, across swamps and over the grassy prairies. The new home was built on a river bank. Lincoln helped his father build a cabin. He split rails to make a fence around the corn field. Then he left home to make his own way in the world. The women cried to see him go. The men gripped his big hand. They all loved him.

He went to clerk in a village store. It was a big, busy town of thirty log houses. The school teacher taught Lincoln grammar. He studied law by himself. He had no money to buy books. In a larger town, twenty miles away, were lawyers. They loaned law books to Lincoln. Still, he had to work for a living. He was a storekeeper and postmaster. He split rails, and he measured land, to mark off farms and roads. There were six years of hard work and lonely study, before he had learned enough to be a lawyer. Then he went away from the village to the state capital to live. More than twenty years later, when our country needed a brave, honest, wise man for a leader, in troubled times, it turned to this Western pioneer lawyer.

Thousands of boys were born in just such cabins in the woods. Thousands grew up into good and useful men. They made farms. They built towns and railroads. They were our great grandfathers. We are proud of them. But we are proudest of all of Lincoln. And we are proud of the worn-out mothers, who died so long ago of the hardships of pioneer days. If our great grandmothers could just have lived to know what men they gave to the world! See LINCOLN, ABRAHAM, page 1073.

X. THE CHILDREN OF THE VIKINGS

*In winter I get up at night
And dress by early candle light.
In summer, quite the other way,
I have to go to bed by day.*

If Stevenson had been a Scandinavian instead of a Scotch boy he probably would never have written that quaint rhyme about going to bed by day and getting up by night. The little people of Norway and Sweden—which together make Scandinavia—get so much night in winter and so much day in summer that it doesn't seem strange to them at all—this getting up by night and going to bed by day.

Scandinavia is so far north that in summer there are only two or three hours of darkness, in winter only two or three hours of daylight. In summer they spend most of the time outdoors. In winter they gather about the big fireplace, spin, knit, sing, play music and tell stories! These stories are about fairies and giants and Norse heroes who slew the giants and sailed those wild Northern seas. Sometimes when the stories are about big giants with ugly dispositions they get into one's dreams; and frightened little girls—I don't know about the boys—tumble out of their cots and climbing into bed with mamma, snuggle so close that, as a certain little American girl said, even the biggest giant couldn't "unsnuggle" them!

Yes, and they *do* have to climb; for the beds of grown folks are built so high that you must use a stepladder as you do in a Pullman to get into the upper berth. Babies sleep in baskets hung from a pole fastened to the wall and have a lovely time teetering themselves whenever they move.

The children have beautiful manners; never interrupt their elders and on getting up from the table say, "Thank you, dear father and mother, for the good food," and shake hands with them. From early childhood boys and girls learn to work. The hardest thing the girls have to learn is how to roll and bake the famous flat bread called knackbrode. It is made of barley meal rolled into sheets a half yard across as thin as paper and—the funniest thing—has a hole in the middle. For what do you suppose? So that mother can run a long pole through it and hang the bread from the ceiling. The boys

tend the garden, catch fish, shoot game for the family table and drive the cows up to the high, glacier-fed meadows in the mountains. In winter they see that the winter wheat sheaf is kept hanging to the barn roof-pole for the birds and help father make useful things at the bench in the farm carpenter shop. But the Scandinavian peoples—boys and girls and all—play at their playtime as hard as they work in worktime. Christmas merrymaking lasts for three weeks and ends on Knut's Day, January 13. Santa Claus they call "Tomt."

It was one of the bold vikings of Scandinavia—Lief Ericson—who first discovered America, 400 years before Columbus, and the Scandinavians have been discovering it ever since. A fifth of all the Scandinavians in the world—including the Danes, who belong to the same race—are now in the States which have been carved out of the old Northwest Territory—Wisconsin, Minnesota, the Dakotas, Iowa and northern Illinois. In later years a great many have gone to Washington and Oregon. In these northern latitudes they can have farms of a size undreamed of in the narrow mountain valleys of Norway or even the plains of Sweden and a climate not unlike that of the old home across the stormy sea. The Norwegians are mainly to be found outside the cities on farms, although there are many Swedish farmers also; because Sweden, being much more thickly populated than Norway, sends more immigrants to this country. Both Norwegians and Swedes being great sailors are found on the vessels of the Great Lakes and both are workers in the lumber camps. Swedes are workers on railroads and thousands of them come to the cities. The better educated hold high positions as mechanical and electrical engineers, as teachers in public schools and professors in colleges.

XI. THE MIRACULOUS PITCHER

If the Holland people brought the Christmas tree to America the Irish brought us something for every day in the year. It was like the milk in the mi-rac-u-lous pitcher. No matter how much was given away the pitcher was always full.

You wouldn't think people so poor would have anything at all to give away. Why, they were so poor the children were hungry. There were Kathleen and Nora and Pat, Larry and Tommie and baby Mary. They lived in a little gray plastered cottage in Ireland. The floor under their bare feet was black earth, the straw roof leaked in wet weather. The farm was just one acre for growing potatoes. A lot of potatoes can be grown on an acre of ground if the weather is just right. But some years there was too much rain and the potatoes rotted. Some years there wasn't enough and the potatoes grew no larger than marbles. One dreadful year many people in Ireland starved. In thousands of cottages there wasn't enough to eat in September. It was plain the potatoes would not last all winter.

The black pot was not half filled, but it bubbled bravely above the peat fire in the open grate. The potatoes made a small heap on the bare table. Father and mother just pretended to eat so the children could have enough. The mother said she didn't care for new potatoes until they got old. That was an Irish joke. It made everybody laugh. Then the father said he would have to step across the sea to England and do some real work to get an appetite. There were two jokes, for the Irish sea was eighty miles wide, and he worked at home all the time. Kathleen gathered up the peelings and two of her own potatoes to feed the pig. Poor pig, he couldn't see the joke. When *he* was hungry he squealed.

Why didn't they eat the pig? They couldn't. He was "the good little fellow who paid the rent." When father sold him the money was sent to the great nobleman who owned the potato patch and the wretched little cottage. He lived in London. All the land for miles around belonged to him. Hundreds of such poor families sold their pigs to pay rent to him. He was very rich. Ship loads of corn were sent from America to feed people, and England sent food and money too. Still, of Ireland's eight million people, three million were hungry. It was hard to get enough food to them and some really did starve.

The Irish people have light hearts and merry tongues and loving words, and these helped them bear the hunger in the great famine. In thousands of Irish cottages it was pet names every other minute. When things were at their very worst fairy god-mothers flew over the sea by thousands. They were letters. In every letter was money. The money was sent by uncles and aunts and cousins, and big brothers and sisters, who had gone to America long before. All these letters said: "Use this money to come to America where there is plenty to eat." Why, that money was like the magic wand that turned Cin-der-ella into a princess. It bought new clothes and shoes; put roses into pale cheeks. It paid for a grand journey on the sea, and set them all down, right side up, in a new home in America.

The only tool the farmer needed was his potato spade. We were digging canals and building railroads then, in America, and any man who could use a spade could earn money. The Irishman was such a good worker, and so quick to learn new ways, that he was soon "boss" of the other men. The children were sent to school. Tommie became a lawyer, Pat the Mayor of the city and Larry a soldier. The Irish people always got up in the world when they came to America. In Ireland they had no chance.

Kathleen was a school teacher and all the children loved her. It was like Mary's little lamb. Kathleen loved the children, and she told them so. Do you know the good Puritans thought it wrong to love people too much—as if you could! And pioneer life was so hard it often made people hard, too. Wasn't that too bad? So, by and by, we forgot how to tell people that we loved them. Then the Irish people came over and showed us how. They scattered jokes and loving words around as free as sunshine.

Kathleen was a darling of a teacher. She had violet-blue eyes with smiles in them. She had red-brown curling hair, a merry laugh and golden freckles on her nose. When she wanted a child to do anything she'd say "Jimmie-dear" just as if it was all one word, or "Pet Marjorie" or "Honey Bee." The children just flew to do things for Miss Kathleen. Other people began to find out that they had loving words, packed away in their hearts and getting rusty. They took them out and polished them and used them every day. No matter how many they used they had just as many left. You see it was like the milk in the mi-rac-u-lous pitcher.

Wasn't that a nice thing to bring to America? See IRELAND, page 936.



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A HOSPITABLE HOME IN IRELAND.

"Fine day, sir, and welcome."

XII. THE GOLDEN FLEECE OF AMERICA.

Did you ever hear the old Greek story of Jason who sailed away to find the golden fleece? Many people think this a story of the world-old hunt for gold mines. Nearly every people has some such story in its history. We have one in our history. Some of your grandfathers can remember when gold was found in California. Some of them were Jasons themselves. They can tell you how they sailed away in prairie schooners (skoon-ers) in search of gold. Prairie schooners were not ships. They were covered wagons drawn by horses or oxen. The seas they sailed were seas of prairie grass.

Don't be ashamed to ask where Cal-i-forn-ia is. Sixty years ago grown up people had to ask where it was and how to get there. They found out that a bird in New York City would have to fly overland three thousand miles, straight west, to get to Cal-i-forn-ia. People wished they had wings too. On half of that land no white people were living. One thousand miles was over high mountains and deserts. It was a terrible journey. Still a great many people went. They thought they would be happier if they had more money.

Men left fields half plowed, houses half built. They sold their farms and shops. In the East they hurried to New York to catch ships, for you could go a long way around by sea. In the West they hurried to Chicago. Chicago was the most western city. It had twenty thousand people. There the gold-seekers bought horses and oxen and covered wagons. They bought flour and bacon and beans; blankets and clothing; guns and tools and water barrels. Eighty thousand men, some women and a few children really went to California in that way, the first summer after gold was found. They went in big parties because it wasn't safe to go alone. All the kinds of people who were in America went.

For five hundred miles west of Chicago there were small towns, corn and wheat fields and lonely cabins. Omaha was just a fort in the Indian country. Near it was a French fur-trading post. You remember the French children who came up the Mississippi, don't you? Then it was just wil-der-ness. The fierce Sioux, the Om-a-has and the Paw-nee Indians lived there. Great herds of buffalo fed on the high, dry, grassy plains. There were no trees at all except along the few wide rivers. But, oh, the flowers! Millions of them, red

and blue and yellow and white, starred the green or brown grass. The land climbed slowly for five hundred miles, until the plain was a mile above the sea. The air was very pure and clear. Fifty miles away people could see the mountains.

One morning the children climbed out of their beds in the covered wagons to see a wall of mountains. It stood nearly two miles high above the plains. Forests were up the sides, snow on the tops. It took days to cross these mountains through high, winding passes, although they were only twenty miles wide. Brown bears and black bears and grizzly bears were in those mountains, and big-horn sheep. In the wide valley behind them were elk and deer, coy-otes, a kind of small wolves, and villages of prairie dogs. After that came mountains again, and then the wide, burning desert.

Here and there, in the desert, was bunch grass for the horses and oxen, but most of the time there was nothing growing but sage brush and thorny cactus. Little rivers trickled through deep gorges. Sometimes the water was bitter with soda. Streams sank away in the sand. Coy-otes howled at night. Black buzzards circled around the sky. There were rattle-snakes and stinging scor-pions.

Whenever water was found the barrels were filled, and every drop was used carefully. Without water the horses and oxen died. Then, everything was left behind and people stumbled across the burning land. Some died on the way. Those who found water came to another steep mountain range. From the top of this they looked down a long, gentle slope. It was green with trees and bright with mountain brooks. At the bottom was a wide, green valley and a river. Gold, in little grains and lumps, was mixed with the sand and gravel in the river beds.

Mining camps sprang up all along the streams. The miners stood in the water. They scooped up pans full of gravel and sand and washed out the gold. A few men found a great deal of gold and became rich. Most of the miners found little. But very few people went home again. The journey was too hard. Besides, California had many other kinds of wealth. Today we call it the Wonderland of America. See CALIFORNIA, page 308.

XIII. ALICE IN WONDERLAND

Alice never forgot the time she went to California with her grandpapa. Grandpapa was going back to California. The first time he went in an ox-wagon, when he was ten years old. Now he was going back from New York City in a palace car. Grandpapa was seventy and Alice was ten. She was young enough to be foolish, and grandpapa was old enough to forget that he had ever been wise. So they went to California together, and they had a perfectly grand time.

Part of the fun came from grandpapa's pretending. You know a great many grown people can't pretend a bit. Grandpapa pretended that everything would look as it did when he was a boy. He told Alice Chicago would be a little city of twenty thousand people. He asked the colored porter of the car how big it was.

"'Bout two million people, suh!"

"My, my, how it has grown since I was a boy," said grandpapa. Alice laughed and grandpapa's eyes twinkled. He pretended to be surprised all the time. Om-a-ha was a big city too. There was no fort, no fur-trading post, no Indians—there were no buffaloes. The grassy plains were covered with wheat and cornfields and busy towns. In front of the mountain wall was Denver, a city of more than one hundred thousand people.

The iron horse climbed right over the mountains. The railroad looped around the curves. It ran along the edges of cliffs, and through long snow-shed tunnels. "Now," said grandpapa, "you'll see bears that *are* bears. Don't the bears come down to the stations, and give you bear hugs, sometimes?" he asked the porter.

"No, suh, not that I evah noticed, suh. I reckon they done gone fah back in the mountains, suh!"

"Too bad, too bad," said grandpapa. "No bears, no big-horn sheep, no deer, no elk. Well, hello, there are some prairie dogs, barking at the train!" There were a few Indians at the station too, and flocks of woolly sheep on the mountain sides, with shepherds and collie dogs, and in the valleys were cattle, and cowboys on ponies. The snow peaks were there, and the dusty desert. But every once in a while they came to a mining town high up on a

shelf of rock, or a green valley with canals running through farms. The water had been brought down from the mountains to make the desert bloom. In the very driest part of the desert they found Salt Lake City, with sixty thousand people, in a big valley between mountains. The valley was all farms and orchards. The city streets were shaded by great trees, the houses set in green lawns. The train ran right across Great Salt Lake, twenty-five miles. Bathers were in the lake. They bobbed around like corks. The water was so salt they could not sink. The train climbed another steep mountain range, then slid down a long toboggan slope, through forests.

"Now," said grandpapa, "I know where I am. I'll show you where I helped my father wash gold out of the gravel in the river bed. It's just below in the valley."

This time he wasn't pretending. He really thought he could find the place, but the mining camp was gone. Gold mining was done up in the mountains. It was done in mills that crushed the gold-bearing rock. The river banks were lined with towns and farms and golden wheat fields. On the hill sides were flocks of sheep. The river grew wider. It met another river flowing north. They ran together and into wide water.

"Where are they going now?" asked Alice.

"Through the Golden Gate, to where the sun sets."

There was a big city built up the hill sides above the water. At its feet lay a wide harbor full of ships. Across the harbor they looked through a narrow strip of water walled with rocks. It was like a thick stone gate. Through the gate they saw the sun set in a great ocean. The city was called San Francisco. It's nickname was City of the Golden Gate. Alice wondered what lay out there over the wide water, where the sun set. She asked if they could get one of the ships and go to see.

"By and by, when we have seen the City of the Queen of the Angels."

Alice hugged herself. This was as good as a fairy story. She hadn't the least idea how it was coming out. Have you?

After they left the City of the Golden Gate they saw mountains two miles high, with lakes at the bottoms of their dark green pockets. They saw rivers sunk half a mile, and lined with steeples and towers of rock. Then they came to the Valley of Delight. Grandpapa called it Yo-sem-i-te Valley. There they left the train and got on a stage coach. One whole day Alice rode on a donkey.



DENVER AND THE MOUNTAINS

Here is beautiful Denver, as Alice saw it "in front of the mountain wall," and the railroad that "loops and runs along the edges of the cliffs."

They slept in a camp hotel. The valley was a mile deep. It was walled with mountains. Rivers fell from the tops of the cliffs. They tumbled after each other like Jack and Jill. A river jumped down a quarter of a mile. That was such fun, that it took a little run over rocks and jumped again. It played hide-and-seek and follow-the-leader and leap-frog down the rocks. Sometimes a falling brook spread out in a broad sheet. Sometimes it fell so far that it turned to spray and looked like a bride's long veil. The sun shone on the spray and turned it to rainbows.

Alice had no time to catch her breath before the next wonder. This was trees more than three hundred feet high and thirty feet thick. She had to lie on her back to see the tops of them. The trees looked very, very old. She thought they must have been born in the days when giants lived.

"Were they here when Columbus came to America?" Alice asked.

"Oh, yes, some of them were eight hundred years old when Columbus came."

Dear, dear! Alice wondered if they weren't tired standing and holding the blue sky up so long. Little white clouds seemed to be tangled in their evergreen leaves.

The farther south they went the warmer and dryer it became. Still there were wheat fields and sheep. By and by there were orchards of gray-green olive trees, and vineyards of big white grapes on gravelly hillsides. Some of the farms had queer houses of sun-dried yellow bricks, and with flat roofs. Many of the people were darker, with big black eyes. Every town and river was called "San" or "Santa" something. Grandpapa said that was Spanish for Saint.

Why, how did the Spanish people ever get away over into Southern California? Alice asked a sheep rancher that, as she drank milk and ate figs as sweet as honey in the patio of a farm house. Do you remember the patios in the houses in Cuba? He took off his broad-brimmed, gold-laced, pointed hat very politely, and said that he did not know. They had been there a good while. Then she asked a priest at an Indian mission church. He said the Spanish people came up from Mexico to live, many, many years before gold was found. The Spanish people made a garden out of the desert. They brought seeds and plants from Mexico, and they coaxed water down from the mountains. Many of the gold seekers did not go back home. They went down the valley five hundred miles to the Spanish towns, and they made more farms and towns near the sea around

Los Angeles. The Spanish had built a town there of sun-dried bricks, and called it the City of the Queen of the Angels. Now it was a great, rich American city of three hundred thousand people.

No wonder the Spanish people called it that! For hours and hours the train ran south through fairy land, and into summer weather, although it was Christmas time. It ran through orchards of orange and lemon trees, through grapes and figs and plums, through groves of almond and walnut trees and olives. The towns were hidden by trees, the houses covered with roses. There were palm trees, and hedges of ger-an-i-ums, ten feet high.

Right over the city of Los Angeles were mountains with snow on them. A real Christmas tree was brought down from the mountains. On New Year's day there was a flower festival. Hundreds of carriages and au-to-mo-biles were covered with roses. Flower fairies rode in open cars. Alice was a white orange blossom in a bride's wreath of little girls. Thousands of people watched the flower procession. Alice was so happy she couldn't sleep a wink that night. She wanted to live in the City of the Angels forever. See CALIFORNIA, page 308, SAN FRANCISCO, page 1671, and LOS ANGELES, page 1116.

XIV. THE CHILDREN OF TOPSY-TURVY LAND.

Wouldn't you like to visit some children who never cry when they are babies? No, they are not Indians, although they ride around on their mother's backs. Their faces are yellow. Their almond-shaped black eyes are slanting. They wear ki-mo'nos. They wipe their little noses on little paper handkerchiefs that they carry up their wide sleeves.

Japanese children! You have seen them in picture books. But how shall we really go to see them?

Let us go back to the City of the Golden Gate. One part of it is like fairy stories. The fronts of the shops are covered with red and gold dragons. This is called Chinatown because the Chinese people live there. If we hunt a long time maybe we will find a Japanese shop. The merchant is yellow, like the Chinese, but he wears American clothes and cuts his hair short. He speaks very good English. We will buy some tea, or a roll of silk, or a blue and white china bowl. If we are very polite, and we tell him we are going to get on a ship and go to Japan, perhaps he will give us a letter, and ask us to call on his brothers and sisters in Tok-io. Won't that be fine to visit Japanese children in their own home?

We get on the big steamship. It is not like the little sailing vessel—the Mayflower—that the Puritan children came in, three hundred years ago. It is a floating hotel, six stories deep, a hundred feet wide and as long as a city block. We sit on the roof of the ship. It is called the deck. The ship plows its way across the ocean. It goes very fast, but it takes days and days to get to Japan because this ocean is nearly five thousand miles wide. When we get to Japan we notice a strange thing. We may look back over the ocean we have crossed and *see the sun rise!* Japan is called the Land of the Rising Sun. The big rising sun is on all the Japanese flags. They float from ships in the harbor, and from tall houses in the city.

Here come the children, down to the dock, to meet us! They look just like their pictures. They are all dressed alike in blue or gray or flowered cotton ki-mo'nos, down to their straw or wooden sandals. We have to turn them around to see which are boys. The girls tie their sashes in big butterfly bows. The boys tuck in the

ends. And the girls do up their hair like mamas. The ki-mo'nos are not pinned or buttoned. They are just folded across the front. To keep the ki mo'nos from flying open the children take short steps and walk pigeon toed. The biggest girl carries baby brother on her back. He is just as interested in what is going on as anybody. The children all smile, and bow very low. It is not polite in Japan to look unhappy or to say cross words. In a minute a little girl will rub her velvety, gold-colored cheek against yours. That is a Japanese kiss. She will put her arm around your waist. Then you are dear friends. She will want you to ride in the same jin-rik-i-sha with her.

Jin-rik-i-shas are like big baby cabs on two wheels. They are pulled by men. The men wear blue or white cotton, butter-bowl hats on their heads, very short, tight breeches and loose shirts outside. In the jin-rik-i-sha you feel like twin baby sisters out with the nurse maid for an airing. You giggle, and your new little friend giggles. Then you ask her name. She says it is Cherry Blossom. That seems too good to be true. Her brother's name is Nogi after a great war hero.

How fast the jin-rik-i-sha man runs—as fast as a horse. He whirls you through the queerest streets. The houses and shops are of gray wood, with heavy, over-hanging roofs of black tiles. They are wide open. The walls are slid back so you can see everything that is going on inside. By and by you come to the children's house. They all kick off their sandals and go in in their stocking feet. No wonder, with such clean white straw mats on the floor! You take off your shoes, too. They are so troublesome you think you will get some Japanese sandals to wear.

What a funny house! It has no windows, no doors, no rooms. The walls slide back to make just one room, and that is open clear through as if it was all out doors. There are no chairs, no beds, no tables. The parlor is at the back of the house. That is the prettiest part because it looks into the prettiest little garden you ever saw.

There is a little hill, and a little river with a tiny bridge across it. There is a little lake with gold fish, and tiny twisted old pine trees. There is a little tea house in the garden. You sit on your heels before little tables a foot high, and a little maid brings tea on a tray. You drink out of dolly tea cups.

Every minute there is something new. The children stop a toy stove peddler and rent a real stove with a charcoal fire in it. You



SCENES IN JAPAN

FROM STEREOGRAPH © H. C. WHITE CO., N. Y.

1 -Peasant and Mt. Fujiyama. 2-Flower garden. 3-Babies and big sisters. 4-Jinrikisha men and cherry blossom time. 5-Japanese Bed. 6-Combing out flax seed.

can have it for an hour for five cents with rice flour dough to bake cakes on it. The girls bring out their dollies. The dollies look just like themselves. The boys fly kites. The kites are shaped like fish balloons, like dragons and butterflies and animals. They play something like pussy wants a corner, and a card game like authors. They call this the game of the one hundred poets. Verses are on the cards and you have to learn them to play well.

At dinner the family sits in a circle on the floor. Each person has a little stool for a table. The maid brings food on little black and gold trays, one thing at a time. There are no knives or forks or spoons. You eat with long ivory pencils called chop-sticks—if you can. You drink soup from cups. Candy and sweet things are brought first. Then you have fish with pineapple sauce, then salad and hard green pears, then rice and tea. There is quite a peck of boiled rice in a round wooden box, with a cover to keep it hot. Rice is Japanese bread. You may eat all you want. If you drop your chop-sticks or break a cup, everybody will laugh and begin to talk about something else very fast. They know you feel bad about it and it wouldn't be polite to notice an accident.

At night the maid slides the walls in place around the house. Then she pulls out more walls, and makes as many bedrooms as are needed. She opens cupboards in the walls and tumbles out dozens of soft thick comforters onto the floor. That makes a bed. You use the top comforter for a cover. She gives you a wooden brick for a pillow. Little Cherry Blossom giggles when she sees your surprised look. But she rolls up a quilt to make you a pillow. She lies down beside you, tucks the block under her own neck and goes sound asleep in a minute.

Before you leave Japan you must go to visit a Japanese school with your little friends. You find they have forty-seven letters to learn, instead of twenty-six. And they have thousands of word signs, that look like very queer, black, bird-tracks. They write with a paint brush. Their books begin at the back, and the reading goes up and down instead of across the page. They sit on mats on the floor, in their stocking feet. They count with wooden beads strung on wires in a slate frame. They have to learn English, too. They say English is the hardest to learn of all their lessons, because it seems upside down.

If you go to Japan in the spring you will see the cherry trees in bloom, and the pear trees and plum trees. The Japanese grow

fruit trees in their little toy gardens just for the blossoms. They have a flower festival when the trees are in bloom. Everybody writes little poems about the flowers on rice paper, and ties them to the trees. Isn't that a pretty thing to do? People try to stay out of doors, in big parks, all they can, in cherry blossom time. They go up the mountain sides where miles of trees are in bloom. They take picnic lunches in little straw boxes. They carry oiled paper parasols for fear it might rain; and when they come home at night they carry red paper lanterns to light the way.

Sometimes Japan is called the Flowery Kingdom. It might be called the land of polite people, or the land of happy children. What would you call it? See JAPAN, page 960. MUTSUHITO, EMPEROR OF JAPAN, page 1292, and *Oriental Art* in article on FINE ARTS.

XV. ALL WORK AND NO PLAY FOR LITTLE WUNG FOO

If Wung Foo had studied very hard at school, and learned as many as twenty-five new sign words, his grandmother told him stories in the evening. Wung Foo was a little Chinese boy, eight years old. His father was a rich silk merchant in Canton, China. His grandmother was a little old lady. But she wore such rich clothes, her face was so carefully painted, and she had so many jewelled pins and flowers in her hair, that she looked quite young. Wung Foo was proud to have her lean on his shoulder when she wanted to cross the room. Her little crippled feet were only four inches long.

Chinese stories for children are the scar-i-est kind. They are all about witches and goblins and dragons. They did not scare Wung Foo, as long as his grandmother talked in her sweet, sing-song way. Besides, his mother, his aunts, his sisters, his girl cousins and his baby brother were there in the women's sitting room. Wung Foo was a visitor. He lived on the men's side of the house.

Wung Foo had a chubby, yellow face and slanting black eyes, like Japanese Nogi. He, too, pushed a great deal of rice into his round mouth with chop-sticks, and drank many little cups of tea. In most other ways he was very, very different from Nogi. Nogi was always laughing, but Wung Foo was a sober little fellow. China isn't nearly as pleasant a place for children to be born in as Japan.

Wung Foo looked very fat in the winter time because he had to wear such thick, quilted cotton under-clothing. There were no little brass box, charcoal stoves, as in Japan, to keep the house warm. And there were no soft mats on the cold brick floors, so his gold trimmed, red cloth shoes had thick, white felt soles. He wore loose trousers of red silk, folded around his ankles, and a wadded blue silk coat fastened with gold buttons and cord loops. He kept his round cap on, even in the house. His head was shaven, all but a thick black lock on top. The barber braided some long, black silk threads with the hair, to make a queue (cue) like his father's, and left a pretty silk tassel at the end. By and by his hair would be long. Then he would not need the silk. The little boy was a small copy of his grandfather.

Wung Foo's little six year old sister was a small copy of her grandmother. She was dressed almost like her brother, but her silk trousers hung loose, like a divided skirt. She lay on cushions, on a bamboo sofa, with her bound feet under her. Sometimes she cried with pain. When grandmother told a fairy story she always said: "The beautiful maiden had such tiny feet that a mandarin's son married her." Then the little girl stopped crying. By and by she could wear satin shoes four inches long, and have her face painted, and dress her hair with flowers and jewelled pins, and very likely a mandarin's son would marry her. Of the hero, grandmother always said: "He learned all the thirty thousand sign words, worshiped at the tombs of his fathers, and became a rich merchant." Wung Foo made up his little mind that he would be very good and study hard.

A Chinese house is just as shut up as a Japanese house is wide open. Wung Foo's home had a wall around it. It stood in a garden, with a lily and fish pond, a bridge, and a curly-roofed tea-house. The women's sitting room was very pretty. It had stools and tables of carved black wood, inlaid with pearl flowers. On the walls were hung pictures embroidered on red satin, or painted on rice paper. There were vases and jars of red and gold, and blue and white. The tea trays were of silver with gold birds on them. The ladies opened and shut scented fans. They spun flax, embroidered on silk and linen and played dominoes. They had pet gold fish and singing birds. They ate a great many sweet things. When they visited other ladies they went in sedan chairs. Sedan chairs are cushioned and curtained and gilded boxes. They have four poles and are carried by men servants. The ladies could not see out of them, very well, or be seen. That was too bad, for the streets were very crowded and gay.

When Wung Foo went to bed in the men's room, he pulled a down quilt over his head. He was only a little boy, after all. In the dark the goblin stories scared him. In the morning he was awakened by a thousand noises. Watchmen told the hour on bamboo drums. Beggars beat on the gate with sticks until a servant went out with rice. Peddlars cried out that they had fish and ducks and eggs and fruits and fat puppies, to sell. A procession banged and rattled and squealed Chinese music. Wung Foo thought it was very sweet music. China had always had it. China never changed anything. He thought the old ways of doing things the very best ways in the world.

One very old way of doing things in China is for little boys to go to school before breakfast, and to go nearly every day in the

WUNG FOO'S WORK AND PLAY



These Chinese school children are playing a Chinese game called "The Dragon Head." On your right is a Chinese boy who earns his living by street exhibits of sleight of hand, such as spinning plates.



The Chinese in cities buy water of these native carriers. That Chinese farmer raises poppies from which opium is made that is the curse of his people. See his opium pipe?



For a fraction of a cent you can have a "street-car" like this all to yourself in China. It is the native Sedan chair and is quite comfortable to ride in.

year. The only vacations are at New Years, in February; on kite flying day in October, and on the feast of the lanterns day. Then fire-crackers pop and snap and bang all day long, as they do on our Fourth of July. When Wung Foo went to school there were a thousand interesting things in the crowded streets, but he never noticed them. He walked along gravely. When he met his schoolmates he shook his own hands inside his sleeves to show that he was glad to see them. The school was much like a Japanese school, except that the boys sat on stools, with higher stools in front for tables; and the teacher was very cross.

At ten o'clock Wung Foo came home for breakfast. At four he came home for dinner. It was a very good dinner of bird's nest soup, fish, duck eggs, chop-suey, rice and gam-got. When chop-suey is made of bits of chicken, ham, water chestnuts, mushrooms, celery and crisp little barley sprouts, all fried together in peanut oil and dressed with spicy brown sauce, it is very good indeed. Gam-got is little preserved oranges about as big as plums. Sometimes he had chrys-an-the-mum fritters, of the flower petals, with pineapple sauce.

Once Wung Foo went on a journey with his father. He went on a boat up the river. The river was so wide there was room for sail boats in the middle, and for streets of house-boats along the banks. Women washed and cooked on the decks of the house-boats. Children played there with little barrels tied on their backs. If they fell into the water the barrels kept them afloat until some one could pull them into the house again. The people who lived in house boats were poor. Boys no older than himself tended ducks in the marshes. Others fished with big birds that were trained to dive. They were all barefooted. The little girls had big feet. They would always have to work.

Wung Foo saw other little boys and girls picking cotton bolls, and tea leaves, and mulberry leaves to feed silk worms, and planting rice in wet ground. He saw them bending over cotton and silk looms, and carrying heavy jars and tiles at the pottery works. They worked for a few cents a day. They lived in huts and ate nothing but rice and a very little fish, and drank the poorest tea. When he went back home he studied harder than ever. He was glad he was going to be a mandarin, or at least a silk merchant like his father. Perhaps he might go away to be a merchant in Chinatown in San Francisco, America, or to Manila, in the Philippine Islands. But when he got very rich he would go back to China. See THE CHINESE EMPIRE, page 389.

XVI. ALL PLAY AND NO WORK FOR MANUELO

Manuelo was a little brown Filipino boy who played nearly all day long. He did not care how many Chinese boys came to his home in The Philippine Islands to be rich merchants. It seemed very foolish to him for anyone to work so hard when it wasn't at all necessary. A cocoanut shell full of rice, and a banana that he could pick from a tree made a very good breakfast. As for clothing, he wore nothing except when he went to the American school. He was a good-tempered, polite little boy. When he went to school he wore white cotton trousers and a jacket, to please the American lady teacher.

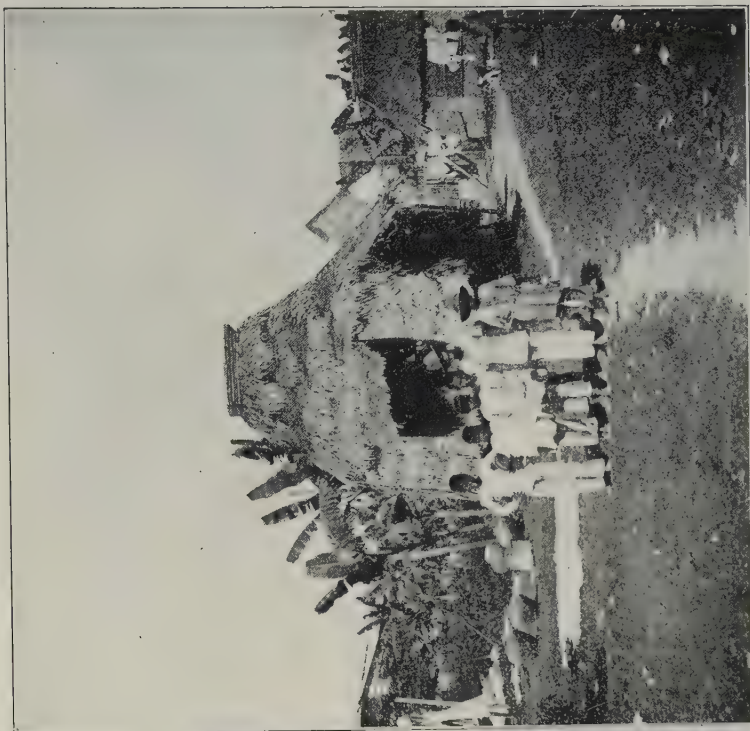
There were many things that puzzled Manuelo. He was a Filipino boy, but his name was Spanish. His language was a mixture of Spanish and his native tongue. Now the lady teacher told him he was an American boy. In the school he was learning to read English. Let us see if we can straighten out the puzzle for him.

Four hundred years ago the Spanish people, as well as the English and Dutch, were great sailors and conquerors. About thirty years after Columbus found America, another Spanish explorer named Ma-gel-lan, found a large group of three thousand big and little islands. They were away over near China. He called these islands The Philippines, after the Spanish King Philip. The Philippine Islands belonged to Spain until a few years ago. Manuelo was a baby when there was a sea-fight in the harbor of Manila. Manila is the largest city on the islands. The fight was between Spanish and American ships. After that The Philippines belonged to the United States. The Spanish soldiers went home. There was a new flag of red, white and blue. The military bands played gay new tunes. Then the lady teacher came. For the first time, little Filipino boys and girls were expected to go to school. You see now how the little brown boy became an American. There are four colors of Americans—red, white, black and brown. You will like to know the little brown American boys and girls better.

Manuelo was small. He would never grow to be a very large man, but he was straight and slender and graceful. His short black hair was straight. His bright black eyes slanted just the least little bit. His lips were thin and red. He was very clean, for he swam



HOME LIFE OF FILIPINOS IN THEIR THATCHED HUTS.



From Stereograph, Copyright by H. C. White

PRIMITIVE FILIPINO SCHOOL HOUSE.

in the sea, or in the nearest river, every day. There are many crocodiles in the rivers of The Philippines, and there are sharks in the sea. Manuelo had to stay in shallow water near the shore.

Our little brown cousin lived in a village of nipa palm huts, under feathery palm trees. His father's house was built of bamboo. It was raised from the ground on thick, bamboo posts. It was thatched with nipa palm leaves. Underneath the house was a room for the chickens, the pigs and the water buffalo. They all made a great noise in the morning and woke the family up. The light woke them up, too. In the walls of the house, were sliding windows set with thin, pearly squares cut from oyster shells.

Manuelo helped himself to all the rice he wanted from the red earthen cooking pot. He took a banana, an orange, a mango, a pineapple or any fruit he liked best. When he had eaten his breakfast, he tumbled down a bamboc ladder to the garden. The garden was gay with flowers and fruit trees. A thornbush fence was around it.

If no playmates were in sight, Manuelo knew where to look for them. He ran first to the Plaza. Plaza is Spanish for open square. The church and the priest's house on the Plaza were as Spanish as those of Cuba. They were colored lemon yellow, and had roofs of red tiles. A few shops, and the best nipa houses of the village were on the Plaza. Market was held there some days, and the village band played there in the evenings. In the early morning the Plaza was empty and quiet. Thick, dark forests were behind the village. The woods ran up a mountain slope. From the bare top of the mountain, the steam curled. The mountain was a volcano. Sometimes the volcano made the earth tremble.

Manuelo ran down a street of nipa huts to the river. The women of the village were there washing clothes. His sister Juanita (Wanee'ta) had a bamboo basket of pineapples on her head. She was going to the big market in town to sell them. Juanita was pretty. She wore a red skirt, and a white lawn jacket with wide sleeves. She smiled at Manuelo and he slipped into the river. He swam and paddled and dived with forty other children for an hour.

In another part of the river were the water buffaloes chewing their cuds. They looked like clumsy, long-horned cows with thick legs, backs bent like bows and skins like pigs. They were plastered with mud. You would think them very ugly, indeed, but they were good-tempered, useful animals. They plowed the rice and hemp and cane fields; they drew the heavy, two-wheeled carts to market,

and they gave milk. Manuëlo called his father's water buffalo by a pet name. The little boy climbed up on the animal's back, then slid down, held fast by her tail and had a ride in the water.

When Manuëlo went home with his mother, he brought her a bamboo pail full of water from the well in the Plaza. He cleaned some rice for dinner. He put some grain in a wooden trough and beat it with a pestle, to loosen the brown hulls. Then he tossed it in the air to let the chaff blow away. He caught the grains in a basket. Sometimes, in the spring, he helped plant rice. He waded in the mud and water to set the plants in rows. You know rice needs a lot of water to grow in. He made fish nets of split bamboo and hemp.

Manuëlo learned to make all sorts of things of bamboo. Perhaps you have a bamboo fishing pole, and you know how light and strong it is. It is hollow inside, and has solid joints. Bamboo is really a kind of grass that grows very thick and tall. Some of the canes are as small as a pencil; some as thick as a man's leg. In The Philippine Islands bamboo grows wild, and the Filipinos use it for many things. Bamboo is used in building houses, carts, bridges, ladders, boats and for water pipes. Split into thin strips it is woven into awnings, baskets and hats. The tender young shoots are good to eat, as we eat celery. If a Filipino is very clever, and is willing to work a little, he can have a very good house and cart, boat and baskets for nothing. And it is no great misfortune if an earthquake shakes his house down. He can easily build another.

Best of all, Manuëlo liked a day in the forest, on the mountain slope, hunting bread-fruit, figs, nuts and eggs. The woods were thick and damp and hot and still. Ferns grew as tall as little trees. The palms seemed to touch the sky. The trees grew close together. There were big, twisted and thorny bushes. In the woods were ever so many curious things. There were the mounds that birds built to hide their eggs. There were tailor-bird nests that were bags of thick leaves, *sewed* with spider webs. The tailor-bird used his sharp bill for a needle. Bats hung by their wing-hooks, and fanned themselves. Monkeys chattered and quarrelled and ran races through the trees. There were orchids (or'kids), great wax butterflies of blossoms, that grew on tree trunks, and fed on the air. Other things were not so pleasant. There were stinging ants and insects. There were snakes that could squeeze little boys to death, and poison snakes. But it was not often that a little Filipino boy got hurt. A number

of boys always went together, and they all kept their bright eyes and their sharp ears open.

If Manuelo's father sold his fish for good prices, he bought a white cotton suit of clothes for Sunday, or a shell comb for his wife. Manuelo's mother and sisters could make good clothing, for every day, of hemp and palm threads; and a very fine, silky gauze of pineapple fiber. But Juanita liked the bright calicos in the Chinese and American shops. She sold her fruit in the market and bought gaily colored skirts and ribbons and slippers.

In the evening, Manuelo's family sat in the open door of the house, and on the rounds of the ladder, below. Big fireflies flitted in the dark garden. They could smell the flowers and fruits. The father played a new tune on his guitar, and Juanita danced. Sometimes his father played with the village band in the Plaza. On feast days, there was a church procession with beautiful tall candles and banners. Fire crackers were snapped and rockets sent up. On dark nights, the sky above the volcano was often rosy with the fires far down in the heart of the mountain.

In the house a light burned all night. The lamp was a cocoanut shell full of oil. A light might be needed at any moment. When an earthquake shook a house, everybody must scramble down the ladder in a hurry. The animals ran out from under the house. The chickens squawked, the pigs squealed, and the water buffalo mooed. The whole village of people and animals tumbled out of doors. When the trembling stopped they all went back to bed again. Manuelo turned over and over on his bed of palm leaves. He was kept awake so long that he thought perhaps he wouldn't wake up in time to go to the American school in the morning.

That would worry the lady teacher, but it wouldn't worry Manuelo. See *THE PHILIPPINE ISLANDS*, page 1469.

XVII. CHILDREN OF "THE ARABIAN NIGHTS"

You have taken a long journey since you sailed through the Golden Gate at San Francisco. Now it is time to go home. There is more than one way of going home from school, and a lot of things to see on the way. So, when you are in far away lands, there is more than one way of going home to America. Don't you want to stop, on the way, to see some children who live in a desert? They live very differently from any people that you could find anywhere else in the world. They have two things you like very much—no, three. They have sugary dates to eat, and big humpy camels and dromedaries to ride. What is the difference between a camel and a dromedary? And they have Arabian night's stories.

If you want to see Mehemet and Zaidee in their tent home in Arabia, you must call upon them very early in the morning, or after the sun goes down. From noon until four or five o'clock, when the burning sun blazes on the yellow desert sand, there seems to be no one living in the big tent. The tent is quite forty feet long, because the father of these children is a Sheik, or Arab chief. It is covered with brown camel's hair cloth, or with black and white goat skins.

It stands on a few acres of grass, under some tall date palm trees, beside a spring. The spring makes a green spot in the desert. All around that green place are miles and miles of dry sand. The sand dazzles your eyes, so you think you see other green places and palm trees and blue water. But these are only air pictures that fade away. The sand is blown up by the wind in great drifts, like yellow snow. In the shadows of these drifts and of big rocks, camels and sheep and goats lie asleep. The herders and sheep dogs are asleep among them.

If you should lift the door flap of the tent you would see a white curtain hung across the middle. This divides the big tent into two rooms. The men and boys are in one room, the women and little girls in the other. It is dark and cooler inside the tent. You must step softly, for everyone is asleep. They lie on colored mats and saddle-bag cushions. These are made of O-ri-en'tal or Eastern rugs. American people buy these rugs for their very best rooms, if they have enough money. The Arab chief buys them in the Turkish city

ARAB LIFE IN THE DESERT



Arabs can ride at full speed on their wonderful horses and, at the same time, aim and fire their guns.



Here is a group of tents in the desert that the Arab child calls "home." Notice how they differ from Indian tents.

ARAB IN THE DESERT PREPARING TO PRAY



HIS LEG IS TIED. HE CANNOT WANDER



When praying, Arabs first kneel, touch the ground with their foreheads, as these natives of India are doing, then rise with hands uplifted toward Mecca, the birthplace of Mahomet, their prophet. The natives of India are Buddhists. (See Buddha (bood'á.)

where he goes to sell his camels and his wool. He has had to pay a good deal for them, but they will wear several life times. Besides, they are the only kind of beds and seats he can carry with him. He has to move about a good deal to find food and water for his animals. He loves the rugs for their beautiful colors and patterns. Can you guess why?

Every one is asleep but Sal'adin, the master's Arabian horse. Saladin stands beside his sleeping master in the tent. He is small and dainty. His coat is like black satin. He holds up his proud head on his arched neck. He stamps his little polished hoofs on the sand. Saladin is the family pet. He is very gentle. He skims over the desert like a bird, with his master on his back. Mehemet gave him some dates to eat before he went to sleep. Zaidee kissed his black nose.

At sunset, a cool breeze blows across the desert. Everybody wakes up and sits on the mats outside the tent. Mother brings her loom to weave camel's hair cloth. The herdsmen milk the camels and goats. A servant woman makes mocha coffee. It is the best coffee in the world. The children drink goat's milk. They all eat crisp bread cakes like our crackers. They are made of wheat, barley or millet seed flour, and baked on hot stones. They eat a stew of goat's flesh or mutton. For dessert they eat dates and almonds.

Zaidee is very pretty. She would not be so very dark, but the hot sun has burned her as brown as a gypsy. Her hair is black and straight. Her soft, almond-shaped eyes are the color of brown velvet. She wears wide trousers and a loose gown of blue cotton. On her head is a blue cloth, bound into a long-tailed bonnet-cap, with a band of goat's hair. She has copper and silver bracelets on her arms and ankles, and strings of glass beads. Her brother wears a long white shirt with a leather girdle, and a white cotton bonnet bound with goat's hair. When they walk on the sharp, hot sand, they both put on leather sandals. The father wears a white turban made of many folds of thin stuff wound around his head. He smokes a pipe.

Sometimes, as the family sits in the starlight, the father or mother tells stories like those you read in the Arabian Nights. Perhaps, because of their dull lives in the dry and barren desert, the Arabs have made up the most wonderfully colored and fanciful stories of any people in the world. Their stories are full of the splendors of palaces and princes. They sparkle with jewels and are woven of

magic. The children of every people in the world listen to these stories with wide, wondering eyes. Perhaps, too, that is why the desert people love the many-colored, gaily-patterned rugs. Spread on the sand they look like flower beds.

As soon as the moon is up, the herders take down the big tent. The water is dwindling in the spring, the grass is almost gone. The family must move to a better pasture. They must go at night, when it is cool. Everything is packed on the kneeling camels. Skin bags are filled with water and bread and dates, for the journey. One by one the animals take a last drink at the spring. The camels fill the little water pockets in their stomachs, to last for several days.

Saladin, the proud bearer of his long-bearded, white-turbaned master, leads the procession. Then come the women and children on the riding dromedaries. The freight camels follow with their drivers; the brown herders and dogs drive the sheep and goats. The moon is a silver crescent in the dark blue sky. The stars are little high, white lamps. The padded feet of the camels make no sound. Camels are called ships of the desert. They swing and rock like ships across the sea of sand.

The procession grows smaller and dimmer in the distance. Now it goes over a great ridge of drifted sand and disappears. Mehemet and Zaidee are gone. But you will never forget this vast plain of white sand under the dark blue sky. It lies there so wide and silent and lonely, under the silver light of the moon and stars. See *Camel, Arabia, Arabian Stories* in article on LITERATURE, "*What is a Mirage?*" in WONDER ITEMS, and "*The Ship of the Desert*" in WILD ANIMALS.



R. H. TALLANT

Courtesy of Dr. Stephen T. Mather

DREAM LAKE, ROCKY MOUNTAIN NATIONAL PARK

Alice, when she arrived in Switzerland, saw high snow-capped mountains. Many times at the foot of these mountains were lakes so clear you could see the stones on the bottom of them. Out in our own Rocky Mountains there are clear, beautiful lakes, like the ones Alice saw. Dream Lake is in one of the National Parks, which some day you may visit.

XVIII. THE LITTLE COUNTRY OF THE BIG MOUNTAIN

After you have watched the ships of the desert sail away across the sea of sand, with Mehemet and Zaidee, you go down to a seaport town and get on a real ship. It steams for hours between yellow deserts. Then, all at once, it comes out through a canal, into the warmest, bluest big sea, dotted with the greenest islands and bordered by the greenest shores. The ship stops at many cities, everyone of them different, with different kinds of people.

In Athens the people are Greeks. Long, long ago the Greeks built the marble temple whose broken columns you may see on the hill. They wrote poetry and made up stories that we read today. They made marble statues so much more beautiful than any people have made since that we put plaster copies of them in our houses.

The Turkish city of Con-stan-ti-no-ple seems to be all round domes and tiny spires. In the shops there, you could buy the beautiful rugs the Arab chief had in his tent. Soon you come to a third city, where water streets are lined with palaces. That is Venice, in Italy. The dark, handsome young men in knee breeches, wide hats and red sashes, who stand up to row the swan-like boats, are Italians. The boats are called gon'do-las. As the Greek people of the old days made temples and statues and poetry, so the Italians built beautiful churches and palaces, and painted wonderful pictures and wrote more poetry.

You will not have time to stop in these places. Besides you will see all these people again, and all together, in the strangest place where you would never think of looking for them. There is just one place more where you really must stop awhile. It is so high up in the air that it would be nicer to go in a flying machine, although you could go in a railroad train from Venice. You can "play like" you are going in a flying machine. It's the easiest thing in the world to "play like" isn't it?

The finest place to start from is the open square in front of a fairy-tale palace, and the fairy-tale church of St. Mark's in Venice. They are all white marble arches and gold, and carved angels and flowers, and lovely spires that go away up to the clouds. Thousands of pigeons flutter about there, and nest in the hearts of the marble

flowers, and between the wings of the angels. They will fly a little way up with you in the gold sunshine. But very soon you leave them below you. Then the spires are below, and even the blue sea drops away out of sight.

Do you know how high you are? Nearly three miles. The air is very thin and pure and clear. Away off to the north you can see piled up clouds, all pink and pearl and violet and gold—and diamonds! See how they flash all the colors of the rainbow in the sun! Why, it's ice and snow—mountains of them away up in the sky! The mountains are called the Alps. And you are above them, looking down. What do you see?

Jagged peaks of rocks and ice are crowded and tumbled together; steep slopes and broad fields of snow lie below them. High between the slopes are hundreds of streams and cascades of glittering ice. Those are the frozen rivers called glaciers. Below them, growing on snowy slopes, are forests of dark pine trees. Farther down are green valleys where cattle feed, and in the deepest pockets of the mountains are blue lakes like mirrors. Surely no one can live in a country that stands on end like the Alps! Oh, yes they can. This mountain country is Switzerland. It is only two hundred miles long and one hundred fifty wide. Two thirds of it is mountains. Some of the peaks are nearly three miles high. But more than three million of the busiest people in the world live in Switzerland. A third of them are farmers, too.

Now you know they must use every scrap of good earth that is as big as a table cloth. On every shelf of rock a stout little house, of stone and pine timbers, nestles. On every wide shelf there is a whole village, with a school house and a church. In the valleys are big cities. On every lake shore are hotels for travellers who come from all over the world just to look at this beautiful land. Nearly every one of these travellers ask their Swiss guides how all those towns and farm-houses came to be scattered over the mountains. And they ask why the Swiss people have no language of their own but speak German, French or Italian, and sometimes all three, as well as English. This is the story the guides tell.

"Once there was a very lazy goblin. He came from the Rhine River, in Germany. He wanted a city, but was too lazy to build one. So he picked up a lot of houses and put them in a bag. Then he went across the river into France and stole some more houses. In Italy he stole palaces and churches. He put all these in his bag



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SWISS MOTHER AND CHILDREN.

With village in which they live, and in the background the Alps mountain range, showing glacier and eternal snows.

and started over the Alps with them. There was a big hole in the bag, so every once in a while a house dropped out, until he lost everything he had stolen. Every house stopped where it was dropped because it couldn't get down again. The funny thing about it was that there were people in those houses, and they staid, too, because they liked the country. They couldn't agree on a King, so they agreed to do without one; and every man kept his own language and learned the others. By and by, so many English and American travellers visited the country, that the Swiss people learned English, too." The Swiss people always tell this story to their children.

The first time her big brother Victor told her the Lazy Goblin story, little Marie Louise laughed. She loved her mountain home. From the air-ship you can see it down there on its shelf of rock. A stone wall with a grove of pine trees is behind and above it, to keep the mountain snow from falling on it. The roof slopes so far out beyond the walls, to let the snow slide off, that you cannot see its many little windows filled with blooming plants. But you can see Marie Louise outside, in her bright blue skirt, white blouse, and black velvet waist laced tight to her plump little body.

Marie Louise feeds the chickens and waters the potato patch. She sits among the flower beds with her knitting and watches the honey bees filling the hives. She has bread and butter and honey, wild strawberries, goat's milk and cream cheese for her dinner. She eats from a wooden bowl that her father made. Victor carved a wild strawberry vine around it. Victor made her a spoon from the horn of a chamois (sham-my). A chamois is a very fleet little mountain antelope. Her winter coat is lined with warm chamois skin. On her spoon handle is carved a bunch of edelweiss. Edelweiss is a tiny white flower that grows high up on the banks of the frozen rivers. This is how Victor got a bunch for a pattern.

He guided some travellers across the glaciers, and away up among the icy peaks. He took his iron-tipped staff, or alpenstock, to keep from slipping, and tied the travellers to loops in a long rope, one behind the other. When he brought them all down safely they gave him money. He showed Marie Louise how high, and in what dangerous places he had been, by the bunch of edelweiss in his hat.

In the summer Victor is a guide. The father goes up the mountain with the cows, to where there is sweet grass. There he lives in a little dairy house and makes butter and cheese. In the winter time they are all together in the house. There is a big porcelain

stove, as white and shining as a bath tub, to keep the house warm. The mother knits and makes embroidery to sell. The men carve wood to sell to travellers the next summer. They make bowls and cups and boxes and napkin rings, and clock cases carved with edelweiss and alpine roses and chamois heads, and with spires like the peaks of the Alps.

The children go to school in the village below. It is a mile away, but they get there in about two minutes. They *slide* down, on sleds. That is fun. But, oh dear, they have to climb back, after school! Once, when it was snowing hard, Marie Louise and some little playmates lost their way, and they got so cold and tired they fell down and went to sleep in the snow. Who do you think found them and brought their fathers to carry them home?

Big, white and tan, Saint Bernard dogs! The dogs live with some good, religious Brothers away up on the mountains, and they go out to find lost people. The dogs were so glad to find the children that they barked and called everybody for a mile around. They stood there by the snow-covered children until men came. The Swiss children love the big dogs.

Victor held Marie Louise on his lap that night, as if he would never let his little sister go, again. While she snuggled there, he finished a clock case. In it he made a tiny room with a spring-door. When it is time for the clock to strike, this door flies open in the most surprising way, and a little bird hops out and says:

"Cuckoo! Cuckoo! Cuckoo!"

Dear, dear, so late as that? It's time you were hurrying home to America. See *Red Sea, Suez Canal, Mediterranean Sea, Greece, Athens, Turkey, Constantinople, Italy, Venice, Byzantine Art, Greek Art, Italian Art*, in article on FINE ARTS, *Greek and Roman Literature*, in article on LITERATURE, SWITZERLAND, ALPS MOUNTAINS.

XIX. THE "FRONT DOOR" OF AMERICA

The very nicest time to get home to America is on a summer morning. You have been on the water nearly a week. You have crossed the same Atlantic ocean, that the white children and the black child crossed, so long ago, to find new homes. As you lie half awake in the bed that is built in the wall of your tiny cabin, some one on deck cries "Land!"

You jump out of bed, scramble into your clothes, and run to the upper deck. All the first cabin passengers are there, leaning on the rail. Far off you see, low down on the water, what looks like a bank of blue cloud. Some are looking at it through opera glasses. The sun strikes across the water. The thin morning fog flies away. Now you see green grass and trees, on the cloud bank. On the other side of a narrow strip of water is a long, sandy point with a lighthouse on it. A cheer goes up. Handkerchiefs are waved. Everybody is glad to get home. Slowly the big steamer moves through the narrow strait. All at once you are in the wide harbor of New York. This is The front door of America. Near the entrance to the harbor, on an island park, is a great statue of Liberty, holding a torch in the air.

What a different scene this is from what the Dutch children found here, three hundred years ago. Then this harbor was a wilderness of wooded shores, with only a few Indian canoes on the waters. Now, the long narrow island in the mouth of the Hudson river, and the shores around the harbor, are covered with high buildings, as far as you can see. The waters are arched with bridges, and crowded with ships.

If all this looks strange to you, think what it must look like to poor foreign people who came to America to find new homes. New ones come almost every day. You didn't know there were thousands of them on your ship, did you? A great ocean steamer is five or six stories deep, you remember. You have lived in the top story, or first cabin. You have never seen the people below you. You can see them now, as they go ashore over the gang plank, if you stand by the deck rail and look down.

A crowd of the strangest looking people pour over the gang plank from the third deck, or steerage. They look like little bits

of all the countries you have seen or read about. Few of the women wear hats. They have handkerchiefs or caps or shawls on their heads. They carry babies in their arms, on their hips or their backs. Little children cling to their short, wide skirts. The men and boys carry mountains of queer shaped bundles and boxes and bags, on their heads and shoulders. They stand by these bundles on the dock, as if they feared to lose them. Men in uniform keep the crowds moving. They shout orders in a dozen languages. The people are weary from the long journey, but oh, so interested in everything, so eager and hopeful. They wait patiently with their babies and their bundles, and do everything they are told to do.

They will not be allowed to leave this dock, as do the cabin passengers. Although they are on American soil they have not been admitted to make their homes here, yet. In the old days, every one could come in freely. They cannot do that now. We found that a great many very old people, and orphan children, and blind and crippled and feeble-minded people, came. They did not belong here, but we had to take care of them. Many bad men came, too. They had been in prison in their own land, and they gave us much trouble. So laws were passed to admit only those who were strong and well, and good honest workers. Every one who comes must have some money to give him a start. Children and old people must have some one to care for them.

All these people must get on a barge, or open boat, and go back to the emigrant station on Ellis Island. Ellis Island is just inside the harbor. You can buy a ticket and go there to see these people examined and questioned by government officers. Your boat is fast so it passes the barge.

When you leave your boat, hurry across the open space to a big building like a railway station. Go up a side stairway to a gallery that runs around a big, white-tiled room and look down. Up the wide, central stairway come the people from the barge. There are thousands of them. See if there are any you know.

Oh, there are the Dutch children. They wear wooden shoes just as they did three hundred years ago. That is an Irish family. The children have merry eyes. That is a German family. The children are stout and fair and rosy. You wonder if "dear mother" has a Christmas tree in that beautiful linen chest she sits on. There are some English or Scotch people. The little girls are shy, the boys

GATE OF OUR PROMISED LAND



HERE IS THE GREAT BARTHOLOMI STATUE AT THE ENTRANCE TO NEW YORK HARBOR AT SIGHT OF WHICH THE IMMIGRANT AND THE AMERICAN RETURNING FROM FOREIGN SHORES, SHED TEARS OF JOY.



A newly arrived German immigrant with his eight children and their "liebe mutter."



Here is the immigrant station on Ellis Island where all foreigners are examined to see if there is any objection to their entering the United States.

independent little fellows. And there are such a lot of people who never came to America at all, in the old days.

Those big, black-bearded men in long overcoats, caps and high boots are Russian farmers. They will go out to wide western plains to grow wheat. We need that kind of Americans. The smaller, long-bearded men who are near them, are Russian Jews. They have had trouble about their religion, and come to us for peace and safety. They will work in tailor shops in the big cities. Some will be peddlers. By and by they will have good shops of their own.

Those men in velveteen jackets with nickel buttons and bright red vests, are Hungarians in their Sunday clothes. Some are in sheepskin coats. Their women have short skirts, bare heads and embroidered aprons. These people will work in mines and packing houses and steel foundries. There are no women with those red-capped Turks who have come to sell us Or-ien-tal rugs. Those handsome Greeks will be peddlers of fruit or of plaster casts of old Greek statues. The Italians, with dark, rosy faces, have dozens of little ones with them. The men are small, but they can do the hardest kind of labor on railroad beds and street sewers. The Norwegians are tall. In their old home they are sailors. They will not be afraid to do iron work on sky-scrappers and bridges. Those fair, very clean young women are Swedes. With the German and Irish girls they make the best housemaids in the world. There are very few people among these new-comers who cannot do some useful work.

Men in uniform are at every door and stair landing. They can speak many languages and they know what country every one comes from by his dress and face. They are kind to these strangers. Now, one says to a scared little Italian woman, in her own language:

"Sig-nor-a (madam), come in out of the draft. The bam-bin-o (baby) will catch cold." She smiles happily to hear her own dear tongue in this strange America. So it goes, all along the line. Five thousand strangers are made to feel at home.

On one stair landing stands a gov-ern-ment doctor in uniform. He looks closely at every man, woman and child. Now he pulls a man out of line and marks a cross on his sleeve with chalk. The doctor thinks this man has tu-ber'cu-lo'sis. That is a "catching" disease, and few people get well of it. He must go to a special room and be examined. Another doctor looks at people's eyes. Another looks at their faces to see if they are bright enough to earn a living. People who are a little sick from the journey are sent to a

hospital, right on the Island, and made well. Children with measles or other "catching" disease that they can be cured of, are sent to city hospitals.

Inspectors look at the numbered tag pinned to each emigrant's coat, and tell him which wire-screened room to go to. There he finds an officer who speaks his language. The officer has a long paper that tells all about him. It was filled out in the seaport town from which he sailed. Now he must answer all these questions again. What is his name, his age, his birthplace? What useful work can he do? How much money did he bring with him? Has he friends in America? Where does he want to go? Has he ever been in prison; or in an asylum; or dependent on charity? What is his health? If his answers are satisfactory and truthful he pays a fee of \$4.00. This is to pay the expenses of the emigrant station.

Then, if he is going farther than New York, an officer goes with him to the ticket office. He buys his ticket and checks his baggage. He finds that, in America, people do not drag heavy bundles about with them, but have them carried safely in trains, for nothing. Then he is put onto a barge with other people going his way, and taken to his railway station. There, another agent puts him on the right train. He is not allowed to go wrong. No one can cheat him or get his money away from him. Many have to wait until friends claim them, or until the sick members of the family come from a hospital. Such people have a big, steam-heated room to sit in. They have good food at low cost. They have white iron and canvas beds to sleep in.

Every one who is admitted to America leaves the emigrant station through a certain swing door. A smiling man in uniform stands there, looks at the admission ticket and points the way. On the door is a sign that reads:

'Push: to New York.'

That is the front door to America.

Once the new-comer is through that door he can go anywhere he likes, in our broad land, to live and work. Some days five thousand emigrants go through that door, and every year a million or more. In a few years they learn to speak English, and all other American ways. Their children go to our schools. They all change into Americans so quickly you think there must be some magic in the words on the front door:

"Push: to New York." See NEW YORK CITY, RUSSIA, HUNGARY, SWEDEN and NORWAY.

WONDERS OF THE WORLD WE LIVE ON

EDITOR'S NOTE TO MOTHER AND TEACHER.—When the writer was a child, Physical Geography was a high school study. A hard name often makes a simple thing difficult. Physical Geography is only land, water and air, and their effects upon each other. It is Home Geography to every child, no matter where he lives, and within his every day experience. Before he goes to school at all, he has made sand houses and mud pies. He has paddled in ponds, picked up pebbles and shells, slid on the ice, thrown snow balls, and sent up toy balloons and sailed boats and kites. Just by using his little hands and feet and eyes, in play, he has learned more about Physical Geography than most grown people realize, and he has put his knowledge to good use. The wisest teaching of today builds upon the knowledge and interests already possessed. It follows nature's plan, too, of continuing to use the objects nearest at hand.

Home Geography, then, is the very first and most fundamental of all nature studies. Loam, sand, gravel, clay, boulders, quarry stone, coal and mineral rocks, can be brought into the house and school room. Out of these, with intelligent direction, little children can build up a miniature world that they can understand. With every natural child knowledge is power. He wants to use what he knows, to "make things." On a common kitchen table, with an upright strip nailed about the edges, he can make a landscape. A child who piles up a tiny hill, levels a field, scoops out a bowl and a trough, and fills them with water himself, can make his own definitions. From these clear mental images, he can be led to imagine the big round world of mountains, plains, rivers, lakes and oceans.

It is very wonderful how quickly a child catches an idea. In his play, he reproduces big things on a small scale. He can make a satisfactory rain with a watering pot, so he will understand the vapor cloud made by a boiling tea-kettle. Most, if not all, of the properties of earth, air and water, can be made plain to a child by just such simple means always near at hand. Air is really no more difficult than the other two. The child already knows temperature, and wind, or air in motion. The little hot-air balloon and the flying bird are among his earliest objects of wonder. The fact that air cannot be seen or felt, only adds to its interest to a child who believes in fairies.

As you read these nature studies in Home Geography, and try the experiments suggested, in doors and out, with the children, watch their minds expand, with new and interesting ideas, and open like flowers. The most important part of education is to get a child to see things accurately, and with such keen interest that he bubbles over to express himself in word, form or line.

WONDERS OF THE WORLD WE LIVE ON

I. LAND

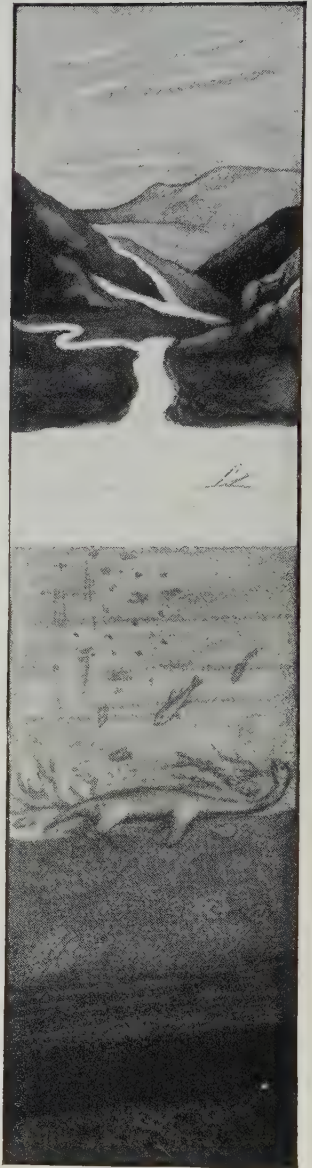
When you went around the world you found that this earth we live upon is made of just land and water. But what a number of things were made with them. No two countries looked just the same, but they were all beautiful and interesting. Do you want to know how they came to be so different?

You need not go around the world again to find out, but it will help you to understand everything better if you will remember what you saw—the grassy plains, the high, rocky mountains, the green river valleys, the sandy desert. No matter where you live on the earth, there is land and water. In any wood or field or city park you can find out a great many of old mother earth's secrets.

This is a perfectly flat meadow, isn't it? It is covered with grass and flowers. Here is a pond, with water-flags and cat-tails and pussy willows growing about it. The water is as still as if it lay in a wash basin. No, there is a ripple on the other side. A little stream, almost buried in grass, is flowing in there. The water runs very slowly. The land on that side slopes a little toward the pond, or the tiny stream could not flow into it. Water never runs any way except down hill. Here is another little feeder to the pond, and another! Here the water runs out of the pond, through a larger brook. The meadow isn't flat at all. It is made up of little slopes. The pond is a small lake. Some lakes are hundreds of miles long, but they were formed just like this pond. The water from them flows out through a big river, instead of through a little brook. They are fed by many small rivers, and by springs underneath, too.

Wherever a pond or a lake is made on land, there must be a low place shaped like a bowl, with the land sloping down on all the sides but one. But sometimes, for hundreds of miles, the land slopes from only two sides, making a trough between. There you would find, not a lake, but a river. When the river is very long and deep, like the Mississippi, its valley is hundreds of miles wide. The slopes rise slowly, but they rise high, to the very tops of mountain ranges. Many big streams run down these long slopes to feed the main river,

THE STORY TOLD IN THE ROCKS

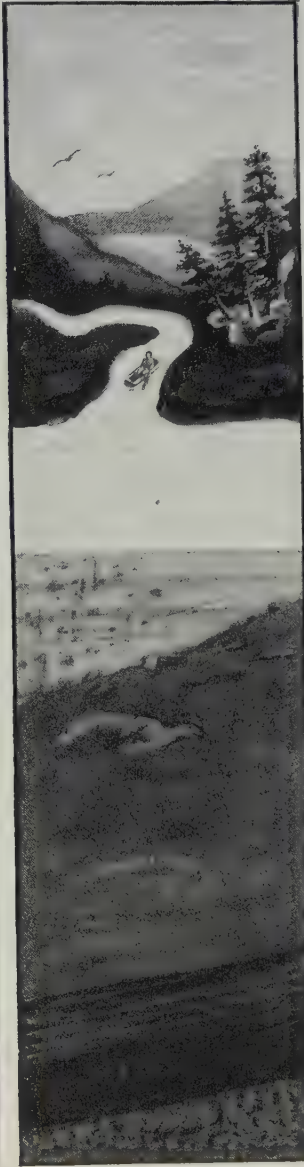
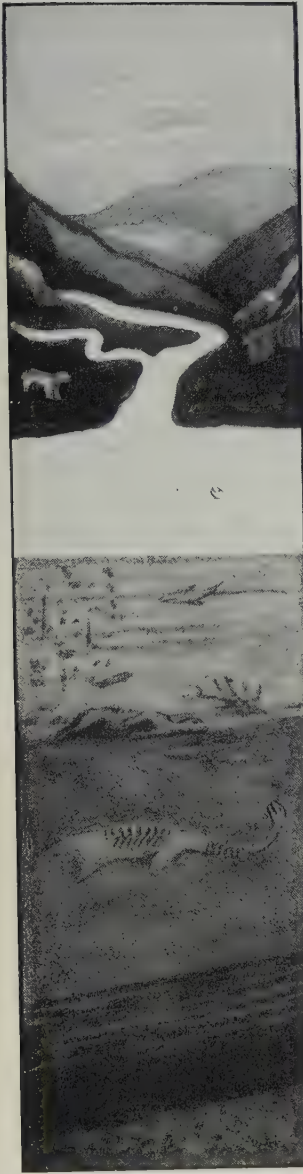


The story of the earth is long. It is found recorded in the rocks. These pictures tell a part of it. You see a stream which ages ago flowed down through the mountains to the sea. Its rushing current carried sand, gravel and stones which fell to the bottom of the sea and covered up shells, bones of fish, etc., which lay on the bottom.

Later great monsters lived in the sea; some of these are shown here. The large one lifting its head above the water had a long name which means "fish lizard." As time passed the stream grew broader and washed down more stones and soil which fell into the sea, covering the sea weeds, shells, bones of dead fish, etc.

The great fish lizard was killed in a fight with other monsters, and its body fell to the bottom. Trees now grew on the land and dead trunks and branches fell into the sea, became water-soaked and dropped to the bottom. All these were covered up by material which was carried down by the stream, now become a great river.

CHANGES IN THE EARTH THROUGH LONG AGES



At length great animals appeared on the land. One of these died on the river's edge; its body was caught in the swollen current and carried to the sea bottom. Here it was soon buried under the shower of soil and gravel which the river kept pouring into the sea. Each layer of this material, sand, gravel and remains of animals spread on the sea bottom hardened into rock under pressure from above.

After long ages men began to live on the earth. They lived in a very crude way. They had clumsy boats made from hollow tree trunks, bows and arrows and stone hatchets. One day a man dropped his stone hatchet from his boat and it fell to the sea bottom and was buried in the mud.

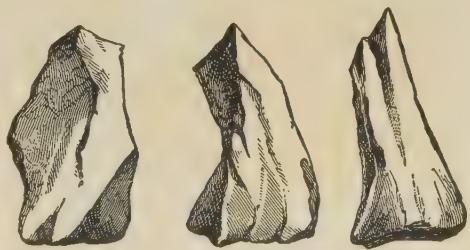
The ocean bed was thus built up toward the surface, and finally became dry land. Men dug deep into the earth, and in the rocks found marks of these buried objects; the stone hatchet, the animal and vegetable remains, shells, bones of fishes, etc., in descending layers of rock, and thus read the story as we have it here.

and little streams feed the feeders. If you made a map of the Mississippi river and all its feeders, it would look like an oak tree with no leaves on it.

Don't you want to follow a brook that flows into a river, and find out where it came from? It's a long walk, and up hill all the way. Make up a bouquet of flowers as you go. If you had a boat you could get some water lilies here, or with rubber boots for wading, some purple water flags. There are some pussy willows. How thick and green things grow, on the low river bank. And how soft and black the soil is. Where it is a little higher and dryer, you can pick ferns and buttercups. Higher still, in the maple woods along the brook, you may find violets. On that high, gravelly bank are tall, weedy looking plants. In the fall, if you come here again, you will find golden-rod and purple asters. The brook is getting narrower and shallower, but it runs faster. There it is almost hidden by hazel brush. See that squirrel? He knows there will be nuts here, and acorns in that oak tree he is running up. The brook is only a thread of water, now, but running very fast between banks of scanty grass. There is some ground pine and pink laurel, and dry gray lichens on the rocks, among scattered pine trees.

Why there is a bunch of ferns and a cushion of velvet moss! Part the ferns with your fingers, and find sparkling water gushing out of a little nest of wet rocks. This is a spring. It is the birth place of the brook. These are the only ferns you found up so high. Ferns love water and soft soil. The spring gives them the food they want.

It seems perfectly flat here. You can look over a high, wide country. Here is another spring. But the brook it makes flows the other way! Then, of course, the land must slope the other way, too. We are on a ridge of land, or divide. Sometimes a divide is called a watershed. It is like the roof of a house. The water flows down each side of a roof to the water troughs under the eaves. The rain washes the roof clean, doesn't



Pieces of rock broken from a cliff by rains, frost, etc., and dropped into a river.

it? Well, the little streams wash the land slopes clean. First, they soften the ground they flow over and make mud. The mud mixes

with the water and goes along with it. Stones are loosened and rolled along, too. Fill a big gold-fish bowl with this muddy water at the mouth of the brook, and let it stand awhile to settle.

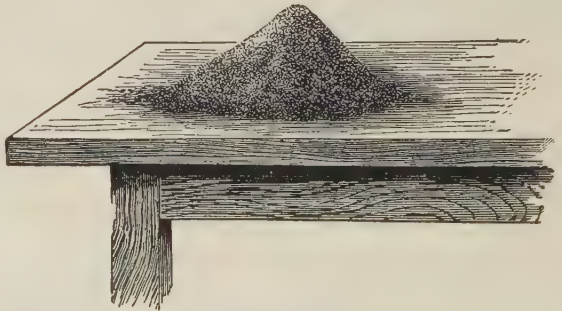
Through the glass you see clear water at the top, then mud, then sand, then gravel. The gravel falls the lowest because it is



Stones from same cliff after they have been worn and rounded by rolling about in the current of the river.

the heaviest. The little brooks rob the hill sides of the soil that plants need, as well as of the water. They melt and break up this soil as fine as they can. They even take some sharp corners from the pebbles by rolling them over and over in the water. Running

water is a busy miller. It grinds earth to mud, and rocks to sand. Then, when it gets down to low ground, where it flows more slowly, it drops all this heavy matter along the river banks, in the river bed, and far out into the ocean. The gravel drops first, then the sand, then the mud. If you dig a well in the valley you will find a layer of loam on top, then sand, then gravel, on a bed of stiff clay or rock. If you scoop out a river bed you find things in the same order. In the ocean you find the gravel near the shore. It hurts your bare feet when you go in bathing. The sand is farther out, and the mud farthest of all. The water sorts all this earthy matter and puts each kind by itself. Isn't that wonderful? The top layer of loam is a mixture of clay and sand and leaf mold. Leaf mold is added every season by falling leaves and decaying seeds and roots. It makes the soil softer and richer.



A heap of sand consisting of particles worn from the stones and gravel in the river bed.

This water miller has several stout helpers in wearing down land. One is wind. Wind picks up dust and scatters it. Then it is more easily washed into the streams by rain. Frost is a regular little wedge and hammer. When water freezes in a crack in a rock it swells, or expands, and splits the rock into pieces. The roots of all plants and trees split the soil, too.

Burrowing animals like muskrats, foxes and snakes make little caves that often fall in. Earth worms and beetles honeycomb the ground with tiny tunnels. Finally men loosen the soil by plowing and building. All these things make it easier for the little water miller to wash down the good top soil.

On high mountains, nothing but bare rocks are left behind, and rain, wind and frost work all the time to wear them down. The water scours the river beds deeper, and carries as much earth as it can out into the ocean. What becomes of the good soil that is washed into the ocean? It has been ground to powder or melted to paste.

Water is very heavy. A little boy or girl cannot carry a wooden pail full of it very far. Every pint of water weighs a pound. The ocean is deep. There are hills and valleys and mountain ranges on the ocean floor, just as there are on land. Some places are as deep as our mountains are high. Tons and tons of water lie over every foot of the ocean floor, and press it smooth and hard. The under layers turn to stone. All the earthy material was sorted, so now it turns to many kinds of stone—sandstone, shale rock and slate. Far out, in the deepest part of the ocean, where sand and mud are never carried, the ocean bed is made of fish bones and shells. These are ground to white powder, by the weight of the water, and turned into chalk or limestone or white marble.

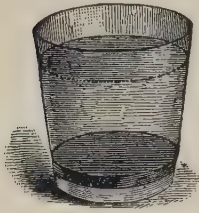


A piece of rock showing the remains of little sea animals which are contained in the rock.

You know what a volcano is, don't you? It is a mountain with a fire in it. That fire comes from the middle of the earth. It lies far under all the land and sea. Sometimes this fire breaks through a mountain top, and it breaks through the floor of the ocean, too. When it does this sandstone is melted, and when it hardens again it becomes granite or lava rock.

There are quarries of all these stones and marbles on the land. If they were made in the bottom of the sea how did they get up on the land? They were pushed up by the fire. The fire melted and cracked and pushed, until the rocky floor of the ocean came up through the water to form rocky islands. A long string of these islands slowly became a mountain chain. In pushing up, the rock

layers were broken and folded in many curious ways. In valleys the rock layers rose more evenly. Just as soon as a point of rock rose above the water, rain and wind and frost and, after awhile, plants and animals began to wear it down. Slowly the valleys between the mountains were raised and filled with finely ground rock waste and leaf mold. The water from above gathered into lake bowls and river troughs.



A glass of water taken from the muddy river, to show how the fine particles worn from the stones, settle down on the bottom as a layer of mud.

You see the story of land goes around a circle. Mother earth is all the time tearing down and building up. She doesn't mind spending millions of years in grinding a mountain into mud and sand; pressing these into stone, and lifting the rock layers into mountain chains again. While she is about it, too, she puts gold, silver and copper, iron, lead and tin, salt, sulphur and coal, and many other things, into all the cracks and holes, and between the layers of stone. She hides diamonds and many precious jewels, too. It would take too long to tell here how she does all these things. It took men thousands and thousands of years to find the keys to unlock the prisons of all these useful and beautiful things.

You really ought to know about coal. It was made by pressure under sea water, like stones. But what do you think it was made of? What do you look for to make a fire? Wood! Rocks may melt, but they harden again. Only plants will burn to ashes.

Ages and ages ago, simple plants like moss, with woody stems and no leaves, grew on big, quiet ponds until they covered the water. The moss died below, but did not decay, and it went on growing on top, until a spongy, floating mat many feet thick was formed. There are many such beds of

moss today. They make a spongy brown fuel called peat. Peat is burned in Ireland and other countries. Peat would become coal, after a long time, if it sank below the sea, mud and sand or shells settled on it, and the sea water pressed it between layers of rock.



This picture shows a vein or bed of coal as it lies in the earth, with layers of different kinds of rock above and below it.

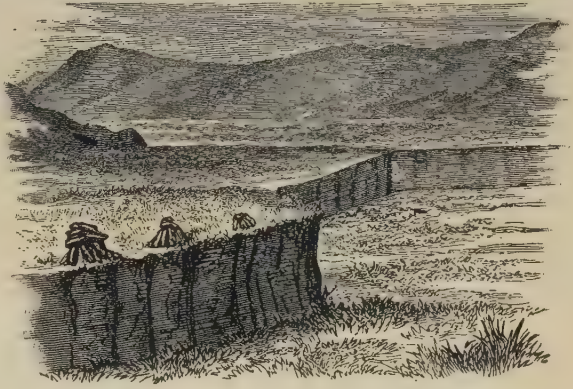


GUNNAR WIDFORSS

ANGEL LANDING, ZION NATIONAL PARK

Beautiful natural scenery like this attracts thousands of visitors each year to the large National Parks the United States has set aside for the people. Alice saw wonderful spots like this when she was in Yellowstone Park.

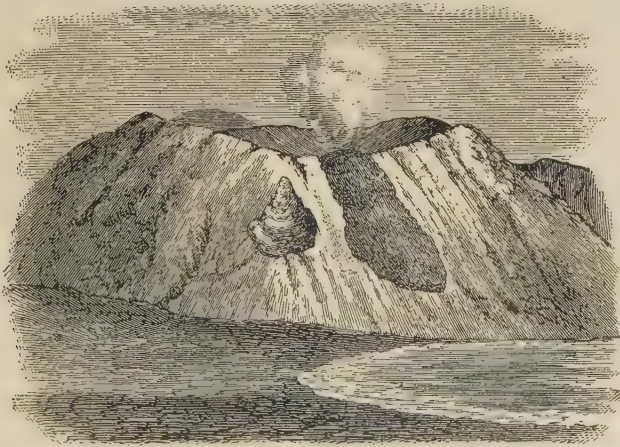
Every part of this earth story is going on today. Volcanoes still burn, earthquakes still lift and crack and fold the rocky floor of the ocean. You remember the terrible earthquakes we have had. They shook down great cities. The earth under them was lifted a little, or dropped a little. One volcano poured out melted rock, or lava and granite, and buried a city. Some seacoasts are slowly sinking, some rising. Small islands come up or disappear. The valleys are being filled up, the mountains worn down by water, wind, frost, men, animals and plants. Tons and tons



A bed of peat, showing where it has been cut out and used for fuel; also small stacks of peat piled up to dry.

of mud and sand are being carried out to the ocean every day, to be turned into stone again. Sea animals are dying, and dropping their bones and shells to the ocean floor.

Isn't it a wonderful story? Don't all these things mean a great deal more to you than they did before? See GEOLOGY.



This picture shows a volcano in action. The hollow top is the crater from which rocks and lava have been thrown out, and a stream of lava is flowing down the side.

II. WATER

The other thing this round world is made of is water. In going around the earth you crossed oceans, lakes and rivers. You saw ice or frozen water. You saw water broken up into rain drops, frozen into hailstones or snow. But there was a great deal of water everywhere that you did not see at all, or if you saw it you didn't know it was water.

The story of water is just as interesting and wonderful as the story of land. Where shall we begin to find out about it? Let us begin with one day when you were a small boy playing out of doors. Mama called you.

"Run in, Johnny, it's going to rain!"

"Why is it going to rain?" you asked. Bright little boys and girls are big question marks, running around on two stout legs. They want to know the "why" of everything. Nearly all of their "whys" are very sensible, too, and ought to be answered.

See that dark cloud rolling up the sky. That cloud is as wet as a soaked sponge. The wind is blowing it up. The wind is colder than the air was a few moments ago. Now the little drops come pattering down. They are as round as shot from whirling so far down from the sky. The sun is out again. The rain has stopped. The dark cloud is gone. Where did it go? It fell to the earth in rain drops. But how did the rain cloud get up in the sky? What is a cloud?

You can make a very small cloud if it is a cold day. Go to the door and breathe into the frosty air. You can see your breath, can't you? Not all of it, just the water in your breath. The water is broken up into very fine mist, or vapor. Vapor is a kind of water dust. The air soaks up vapor as a sponge soaks up water. There is a beautiful little vapor cloud coming from the teakettle. The air soaks that up too. A wash boiler full of boiling clothes makes a big cloud that fills the kitchen. If you open a window or door it will all go out and be soaked up by the air.

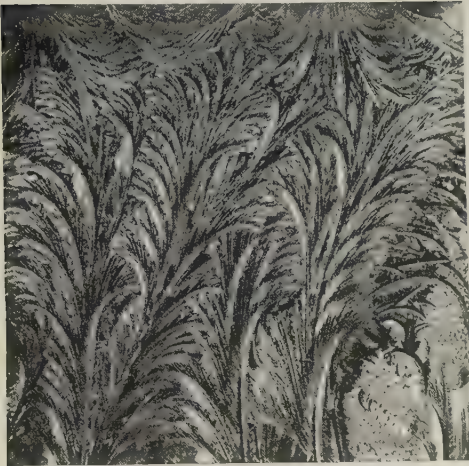
If a cloud of vapor is made in a house and cannot get out, let us see what happens. The vapor from boiling water is very warm. The glass window is colder. The vapor gathers on the glass in a mist of tiny drops. The little drops roll together into big drops.



HOAR FROST ON BLACKBERRY LEAF.



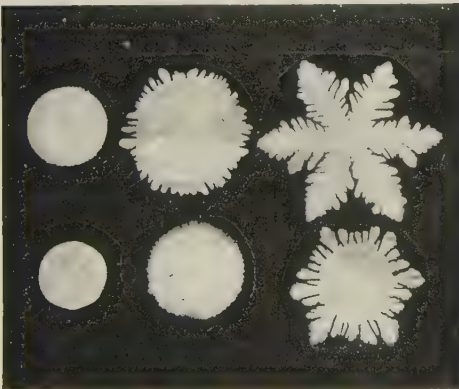
HOAR FROST ON GRASS BLADE.



FEATHER-FERN FROSTWORK ON WINDOW.



SCROLL FROSTWORK ON WINDOW.



DEVELOPMENT OF ICE CRYSTAL FROM SMALL ROUND TO LACE-LIKE FORM.



CORAL-LIKE BRANCH SHOWING FEATHER TYPE IN DETAIL.



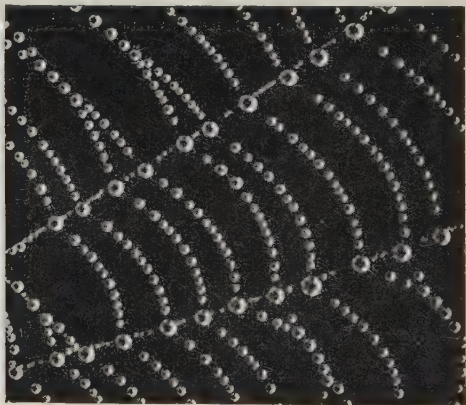
CUMULUS, A LIGHTLY FLOATING FAIR WEATHER CLOUD.



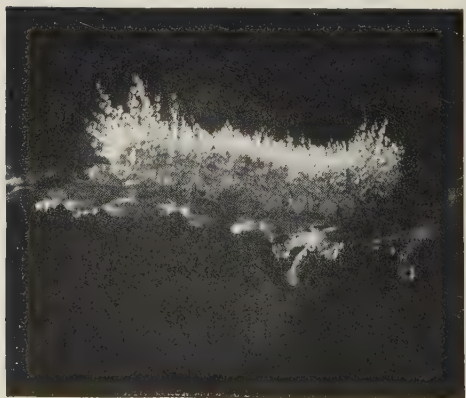
THUNDER SHOWER CLOUD.



DEW-LADEN FLOWER AND BUDS OF THISTLE.



SECTION OF DEW-LADEN SPIDER'S WEB.



SLEEPING CATERPILLAR DECORATED WITH DEW-DROPS.



DEW-LADEN GRASSHOPPER ASLEEP ON BED OF FLOWERS.

The wonderfully beautiful photographs of dew and frost and also of snow crystals which we present, were furnished for this volume by Mr. Wilson A. Bentley, who is recognized as the pioneer in microphotography, and who has been employed by the government in this work for many years.

These get so heavy that they roll down the glass. They roll down the walls, too, and drop from the ceiling. If vapor is not turned out of doors it makes a room damp. That is just what happens when it rains. The vapor in the air goes up into the sky. When it finds a cold layer of air it rolls into large drops and falls.

Vapor is always going up. Most of it goes up from the ocean, the lakes and rivers. Three fourths of our big world is covered with water, you know. The sun warms the top layer of water and turns it into vapor. Every leaf and blade of grass on the land has water in it. The sun steals this water, too. Sometimes it takes so much and gives so little back again that the grass turns brown, and the leaves wilt. Every animal and plant drinks water and breathes it out again from the lungs, or gives it to the air through little holes in the skin called pores. You know how you perspire on a hot day? Little beads of water ooze out, all over you. You can find your pores with a mag-ni-fy-ing glass. You can find pores in green leaves, too.

Plants and animals perspire more on a hot day than on a cold one. The land and water give off more vapor in the summer than in the winter. Wring a handkerchief out of hot water, hang it in the sun and see how quickly it dries. Set a shallow pan of water in the sun and see how soon the water disappears. The air is always thirsty. It drinks like a greedy fish.

But then, it is not stingy. It gives back every bit of water it gets. But it does not always give it back where it got it. Sometimes it rises in vapor from the ocean, goes up in the sky to a layer of cold air, and falls back into the ocean almost as quick as you can say Jack Robinson. But it's a very good thing for little boys and girls and trees and bees, that all the vapor doesn't do that. The ocean doesn't need the water rightaway, and the land does. A great deal of vapor goes on long journeys. It uses the wind for horses. Haven't you seen fleecy clouds floating across the sky? They were riding on the wind. The winds find it no trouble at all to carry these vapor clouds along with them. The vapor clouds travel until they strike a cold layer of air. Then they roll into rain drops and fall.

As oceans are the great vapor tanks, so mountains are the chief rain makers. The tops of mountains are very cold, and they are so high up in the air that the vapor clouds bump right into them and turn to rain. In the winter the air is so cold that the rain, in falling, freezes into snow. Wide river valleys, islands and sea coasts, get a great deal of rain and snow, too, if the winds blow over them

from the ocean. If the wind blows away from the land, so that it gets no rain, that land becomes a desert.

Just as the ocean is a great tank for making vapor, so the mountains and woods and cold countries are big storage houses for snow; much of the summer rain is lost. It runs off at once into streams, or is soon taken up again by the sun, in vapor. But snow lies for months, in cold, high, or shaded places. In the spring it melts slowly and soaks into the fields. It takes snow a long time to get into rivers. It gives plants and seeds water just when they need it, to help them grow. A farmer can get along in a dry summer, if there has been a wet winter.

In the story about land you saw what a big part water plays in this world of ours. Every drop of rain that falls takes up just as much dust as it can carry on its tiny round back, and hurries away with it. It washes the dust and smoke and bad smells out of the air, and leaves it pure and clean. It washes the dust from all plants and makes them bright. It would give you a merry shower bath if you stood in it. It washes the houses and the streets. You can see muddy water running down the gutters. How clean everything is, even the pebbles in the road, after a bright, hard rain. Mother Earth has had her face washed, and she looks as if she liked it!

Sometimes vapor clouds cannot get above the earth. You know the steam from the boiling clothes could not get out of the kitchen until you opened a window at the top. If the air lies very heavy above it and does not open a place for vapor to go up, it lies on the earth. Such low clouds are called fogs. You remember the kitchen walls dripped with vapor, making the room damp? Thick fogs make people and plants almost as wet as rain. Fogs are oftenest seen over the ocean, lakes, river valleys and swamp land. Sometimes they cover miles of sea, and shut in ships with milky white curtains of vapor. Then the ships must blow fog horns to keep other ships from running into them. The morning sun pulls a fog up into the sky, or a brisk wind scatters it through the air.

There is always some vapor in the air near the earth, even if there isn't enough for you to see it. If a pitcher of cold water stands in a room a little while, beads of vapor form on the outside, just as they did on the cold window pane. Sometimes the earth is cold enough to collect vapor beads from the air. When a cool night follows a hot day, the earth becomes colder than the air above it. So the warm vapor collects on cold plants, and spangles them with dew

drops. If the night is very cold when dew forms, the little dew-drops are frozen on the plants. Then we have Jack Frost.

Jack Frost is busy with you, too. He takes the vapor of your breath and per-spi-ra-tion, as you lie warm in bed, and makes pictures with it on the cold window pane. Such pretty pictures! They are all mosses and ferns and grass spears, and spangles to trim fairy queen's dresses.

Cold is a wonderful artist with water. It makes snow crystals and hailstone pearls. Hail is made when the air is at the freezing point of water while snow is formed when the air is below this point. It may even snow and rain at the same time; the moisture first forming into snow in the cold air of the upper regions and then turning to rain as it passes through air warm enough to melt it. It frequently snows on the mountain tops while it is raining in the valleys.

The Indians called pop-corn the corn that flowers. So snow is moisture that blossoms. Next time you see a quiet snow storm, when the snow falls in large soft flakes, ask your mother for a piece of black velvet or cloth. Put it out of doors to get cold, but keep it dry. Then catch some snow flakes on it and study them through your pocket microscope. Most of them will look like little broken feathers. But if you are patient, you will be sure to find some that are perfect, six-pointed stars. The points will be veined and fringed like the petals of a flower. All snow flakes should be six sided or pointed crystals. Most of them are torn by the wind, or get their points knocked off by falling against other flakes.

Hailstones are made in quite a different way from snow flakes. Snow falls only in the winter, but hail storms come in summer, on hot days. Weather men think that when rain drops are formed in clouds, and are all ready to fall, they are suddenly pulled up much higher, into freezing air. The rain drops freeze but do not burst. Then they fall through other rain clouds, and more water freezes on the balls of ice. They are tossed up and down until they become so heavy that they drop like bullets. They drop so fast that they pass through the warm air near the earth without melting. Sometimes they are as big as pigeon's eggs. Find a very big one, some day, and ask papa to cut it across quickly, with his strong knife. You will find that the hailstone was made in layer rings like a lily bulb. The oyster makes the beautiful pearl in the same way. Around a hard center it puts layers of the pearl with which it lines its shell house. The hailstone pearl is just as beautiful as the shell pearl, but it melts so fast it is hard to study it.

But you can study larger pieces of ice. On very cold mornings you sometimes find a glass of water frozen. The water did not fill the glass, and was level. But the ice is pushed to the top, and into a little mound in the middle. When water freezes into ice it takes more room. Big people say it expands. In reading about land you learned that rocks are split by water freezing and expanding in the cracks. If water freezes in water pipes in a house, the pipes burst. Then a plumber has to come to mend them. Running water does not freeze as easily as still water. So, on cold nights, it would be a good thing to leave a faucet a little open, to keep the water flowing through the pipes.

Ice is lighter than water, that is, it fills more space for its weight, so it floats on water. It forms on top of water first, and freezes downward. You never can tell just how thick it is from the top. Before you try to slide or skate on a pond or river, you should take a hot poker and melt a hole through the ice to see how thick it is. And when ice is ready to break up, it gets "rotten" or spongy, first. You must always obey a "danger" sign that grown people put up on ice.

It is fine to see ice break up in a river. But keep off the bridges. The big blocks of ice crash against timbers and stone piers, and sometimes destroy the bridges. Sometimes, in fogs, icebergs crash into ships and sink them. When you crossed the ocean you may have seen icebergs as big as hills, floating in the sea. If you did you wondered how they were made.

Do you remember the ice rivers, or glaciers, in the high valleys of the Alps mountains? Away up north, where the Esquimos live, all the rivers are frozen. They melt a little in the summer, but more snow falls every year than is melted. The new snow presses on the old below, and squeezes it into ice, or very hard water rock, just as sea water presses sand into stone. This ice is pushed down the river beds by the weight above. The ice rivers reach the sea just as all other rivers do. In the summer the ice that is near the sea melts, or it becomes "rotten" and breaks off in large chunks. Those chunks are icebergs. They float into warmer water and melt.

It may have been a hundred years since the icebergs you saw were fleecy vapor clouds, riding on the wind-horses, in the blue sky. But there they were at last, in their old home in the ocean. Soon the berg will melt. Then the sun will turn it into vapor again, to begin another journey. (See WATER, OCEAN, SEA, GLACIER, WATERPOWER, etc.)

III. AIR

Besides land and water on the earth, there is something that is all around it, and all through both land and water. You cannot see it, or feel it, or taste it, or smell it, or hear it. But you can prove that it is all around you in a great many ways. You can take it to pieces, too, and find out what it is made of.

Measure your chest with a tape line. Twenty-eight inches? Now breathe deep, deeper. Hold your breath and measure again. Thirty inches! You filled your lungs with air. They were just as full of air as this glass pitcher is of water. This drinking glass looks as if it was empty, but it is full of air. Turn it upside down, and press the open end on the top of the water in the pitcher. Push it straight down under the water—steady; don't let the glass tip up. The water rises outside the glass and overflows. Lift the glass carefully. It is dry inside, except for a narrow



rim at the top. Some water did get inside, by squeezing the air in the glass into a little smaller space. See how much water was forced out of the pitcher. Nearly a glass full!

Big boys who dive and swim under water, fill their lungs with air first and hold their breath, so water cannot get into them. That is a very useful thing to learn to do. It saves people from drowning and makes them able to save other people.

Have you ever heard people say: "As light as air?" Perhaps you think air doesn't weigh anything.

Did you ever pump water from a well by working a pump handle? You had to pump several times before the water came, didn't you?



You had to lift the air out of the hollow pump before the water could come in. Pumping air is hard work. There are several simple ways of proving that air weighs something. Empty the teakettle of water and take the lid off. Now lay a sheet of rubber cloth over the top. Put a glass or rubber tube into the spout, and draw the air through the tube into your lungs. Breathe again. Suck all the air out of the kettle. See the rubber cloth sink. The air on top is pushing it into the kettle. There it goes, down inside. There is no air in the kettle to hold it up.

Now blow into a little rubber balloon. See it swell. Blow again, the rubber stretches. See how much air you can blow into it. Ah, it burst! There was more air inside the balloon than there was outside. Fill a glass with water until it overflows. Cover the top with a sheet of thick, smooth letter paper. Press it all around the edges so you are sure no air can get between the glass and the paper, to let the water out. Now take hold of the glass by the bottom and turn it upside down. The water will not spill, the air below holds it up. Turn back to *Air* in this book and find out what air weighs.



Just as fish and sea plants may live at the bottom of the ocean of water, so land animals and plants live at the bottom of the ocean of air. The top of this ocean of air is level, too. Do you think the air on a mountain peak would be as deep or as heavy as the air in a low valley? A glass full of water has no color. But an ocean full of water looks blue. We cannot see air itself, but we can see the color of it. When it is forty miles deep air looks blue, too.

Robert likes to climb trees, so he is just the boy to get up on a step ladder and take down those dusty curtains. Warm up there, Robert? Hot air goes up, so it is always warmer near the ceiling. You remember how warm air carries vapor up to make rain? It is the hot air that carries smoke up from chimneys. Did you ever send up a red paper balloon on the Fourth of July? You lit a tiny candle at the bottom. Soon the sides of the balloon swelled and stretched tight. Air expands when it is heated. That is, it

takes less hot air to fill anything than it does cold, so it grows lighter. The balloon floated around the sky until the candle burned out.

Warm air is always going up and cold coming down. Out of doors Mother Nature attends to this pushing, but in houses we have to help, by letting the warm air out at the top and cold air in at the bottom. Air is always in motion unless it is in prison, and prisoned air is very bad to breathe. Still air is dead; live air is always in motion.

Sometimes air rivers flow up and down so rapidly, pushing each other out of place that they make—what? See the leaves blowing on the trees. Wind! Wind is air that is in a hurry. You can feel it. Draw a *quick* breath. You felt a tiny wind in your nose, didn't you? You cannot feel air, but you can feel wind, or air in motion. You can feel the temperature of air, too. Your skin tells you if air is hot or cold. You can feel if it is damp or dry. You cannot smell air, but you can smell odors in it—the perfume of flowers, the freshness of rain, bad odors of decay, or smoke. You can train yourself to tell if the air in a room is fresh or stale. Doctors always come into a sick room with suspicious noses in the air. As we have to pay doctors for telling us when the air is bad, let us see if we can find out for ourselves.

When you were up on the step ladder, Robert, did you notice anything beside the heat? You felt smothered, then dizzy? You don't feel that way on the hottest summer day out of doors, do you? Let us see what was the matter with that air.

Put half an inch of water in a pie pan. Twist a bit of soft newspaper, light it with a match and drop it into a drinking glass. Let the glass fill with smoke, but while the paper is still burning turn the glass upside down in the pan of water. The flame goes out, leaving some paper unburned. The water *rises* in the glass, much higher than in the pan outside, and stays there. Something was burned out of the air, making room for the water to rise. The part that is gone is oxygen. If you had shut a live fly in the glass it would have died as quickly as the flame. Animals and fire cannot live without oxygen. By breathing air in you burn up oxygen. It would not take you very long to use up all the oxygen in a small room. Then, if you couldn't get any fresh air at all you would "go out" like the burning paper, and the fly in the glass.

Beside using up the oxygen in the air, when you breathe in, you make a poisonous gas when you breathe out. Fire does the

same thing. Here is a bottle of clear lime water. It cost two cents at the drug store. Divide this lime water between two small fruit jars. In one of the jars hang an inch of lighted candle above the lime water, by a wire twisted around the candle and hooked over the top. Cover the top of the jar with a folded napkin. The flame goes out as soon as the oxygen in the jar is used up, of course. But something else happens, too. The clear lime water turns milky. The flame gave out a gas called carbon dioxide, or carbonic acid gas.

Put a tube of rubber or glass, or a big lemonade straw, into the lime water in the other jar. Blow your breath through the tube, into the water. You can tell when you have forced your breath in, for you make bubbles. Do this several times. This water turns milky, too, from the carbonic acid gas in your breath. Your breath is warm so it goes up to the ceiling. The air made by a gas flame, a heat register or radiator goes up, too. All this warm air has been used by fire and by people. The oxygen has been burned out of it, and carbonic acid has put into it. It would not feed a fire or a pair of lungs, and it becomes even poisonous. This is bad air. It will go out of doors if you help it, and be purified.

Beside helping to keep people well, to know about air may help them at any time to put out a fire. Fire cannot burn without oxygen, so it can be smothered. If your clothing catches fire roll up in a rug or heavy bed clothes. Keep the fire from getting air and it will go out.

Out of doors, nature is always purifying air. She does it by having plants and animals live together. Plants make oxygen and use up the carbonic acid gas that is poisonous to breathing animals. In the sea fishes and water plants help each other, in the same way. They get air out of the water. Seeds and worms and beetles get air out of the earth. If you plant seeds too deep, or pack the earth too hard above them, they will rot. So you must read the directions on your little paper of flower seeds and obey them, or you will have no flowers. You can kill little animals by stopping up their holes sometimes.

See how wonderfully this world is mixed up. Earth is solid, water is fluid, air a gas. But there is water and air in the earth, earth and air in the water, and earth dust and water vapor in the air. They all need each other, and plants and animals need all three. Air is the freest and sets everything else in motion.

Wind, or air in motion, is a great worker and wonder-worker. It tosses the tree tops, whirls the dust, carries vapor clouds to make rain, scatters seeds. It turns the long arms of windmills and sends sailing vessels flying over the water. It waits for nobody. It says how-do-you-do and good-by, and is gone. There isn't a bit of use to get out of humor with it, if it blows our hats off and turns umbrellas wrong side out. The wind can't help blowing. It is being pushed and jostled about itself. Besides it has the most important work in the world to do—keeping air in motion and purifying it. So get off the track. Wind has the right of way. See AIR, page 33; RESPIRATION, 1602.

THE STORY OF LIFE

PART I—PLANTS

EDITOR'S NOTE TO MOTHER AND TEACHER.—Often, before he can talk plainly, a little child has some sense of the mystery of life, in himself, his playmates, his bird and his dog. Later, he recognizes that the flower and tree are alive, too. He asks endless questions about life, its nature and origin. Any child old enough to put a little brown seed into the ground, with confidence that a flower will grow from it, or who sees a downy chicken or crying bird come from a shell, has a natural curiosity about them that should be and can be satisfied.

He can comprehend that all life reproduces itself by means of seeds and eggs, and grows from these simple seeds into the more complex form of the fully developed offspring. To learn this in the right way is now recognized as the most serious requirement, as it has always been one of the most difficult problems, of his education.

In this "Story of Life" we compare the forms and functions, first of plants, then of animals, from the lowest, simplest types to the highest and most complex. So far as the editors are aware, this is the first attempt ever made to present Biology, or the Science of Life, to little children, and to show them some of the more striking resemblances among plants and animals which point toward a common relationship to one Great Source. The stories are as fascinating as fairy tales. They open up to the child, a new world of wonders; a world of intelligent plan, of order, of beauty and of the brotherhood of living things. They teach reverence, sympathy, and a sense of the worth and sacredness of all life.

Because of its appeal to the imagination—particularly of the young and in the treatment of a difficult scientific subject—the dramatic form of expression is here frequently employed; as "The Earthworm Puts on Armor." But the discussion of any particular theory has been purposely avoided, because we believe it would be out of place, and because these great and sacred truths, upon which we all agree, seemed to us of so much larger importance.

PART I—PLANTS

I. WE MEET THE FAIRY GODMOTHER

What if you had never seen an apple, or an apple tree! Little Esquimo boys and girls never saw them. So, just imagine that you never saw them, either.

Then, if a traveler from a strange country should bring you a little brown seed, a green leaf, a pink blossom, a bit of the wood of the apple tree and of the bark, and a juicy red apple to eat, and should tell you that they were all parts of one plant and had grown out of each other, and were made from one common food, what would you think? Very likely you would say: "What a lovely fairy story. Please tell another one."

If he were a very wise man he might say: "Very well, here's another one just like it." He would ask you to look at baby brother. Even Esquimo children have baby brothers. See his dewy, pink satin skin. Feel the soft flesh under it, and the hard round bones under that. Feel his loving little heart beat. Look into his merry blue eyes; brush the sunny curls on his head, and let him bite your finger with his pearly teeth. Watch mama cut the shell-pink finger nails that can scratch like pussy's. Those things—skin, flesh, bones, heart, eyes, hair, teeth and nails—all so different, are all a part of the baby. They are all fed and made to grow on just one food—milk. Then, maybe you'd be able to believe that the apple tree might be a really, truly story.

And that would help you understand that all living things—plants and animals—the baby and the apple tree, all of them came from seeds, and are sort of far-away cousins to each other. Isn't it pleasant to think that we are related to butterflies and birds and apple blossoms? Only children, and a few very wise grown people, can understand how this can be. Children can imagine things. They can imagine what fairies would look like if there were fairies. So they can understand the wonderful true stories that science tells, about things as strange as fairies. And then children are curious, and it is easier for them to change their minds. That makes their minds

grow. The mind is like everything else in the world. It can grow only by changing.

Don't you like for papa to open the back of his watch so you can see the wheels go 'round? When he does that you want to know what makes them go 'round, don't you? You want to know how and why each part of the watch works for and with the others. A plant or an animal is more wonderful than a watch. A watch runs down, and has to be wound again. But plants and animals have little live wheels that wind themselves, and keep going as long as they live. And before they die they start other plants and animals just like themselves—or even a little better—to going.

To understand it all you will have to go a long way back. There couldn't have been a watch until there was a wheel, then another wheel to turn on that, and a spring to make them turn. So there could never have been a plant or an animal until there was a little living wheel, or cell. Did you know that men of science, who have studied life in plants and animals, have found out what that cell looks like, and what it is made of? It is just a tiny, egg-shaped bag so small that you cannot see it, except under a microscope, and as colorless as a drop of water.

Still, that little living cell has a skin or thin wall around it, and it is filled with a drop of magical jelly. The jelly is alive. What is it to be alive? A bit of sponge can soak up water, but it cannot use it, or make anything out of it. A silk worm eats mulberry leaves, grows larger on this food, makes a silk cradle to go to sleep in, and hatches out into a butterfly that lays more silk worm eggs. To be alive, is to eat and grow, and turn the food into something else and, don't forget this, make more living things like itself. That is why we know that the little drop of jelly is alive. It is the smallest, simplest live thing in the world. Of course, it is so important it has to have a name. It is called Pro'to-plasm.

The wonderful cell full of protoplasm is the fairy godmother of every living thing in the world. It is the "once upon a time" with which the story of life begins. It has done more wonderful things than to turn pumpkins into gilded coaches and mice into horses. It didn't do them all at once, just by waving a wand. It began in a very humble way, and took one small step at a time. At first it was contented to make another little round cell just like itself, then another and another and another, all as alike as so many peas. But each one of those cells full of protoplasm could

eat and grow, and keep itself wound up, and make other little cells. Then, by and by, after ages and ages, because they were alive and their home wasn't always the same, some of the cells changed a little, and they kept on changing every time they had to.

Now, every step that was taken forward from the little cell full of protoplasm, lives in some form today. So we can follow the story of life, step by step. You can find the beginning of it in a loaf of bread. When your mama makes bread—no, mama doesn't make bread, she helps bread make itself, by—but that's another story. (See CELL, CELL-DOCTRINE, PROTOPLASM, BIOLOGY.)

II. HOW THE YEAST PLANT GROWS IN A LOAF OF BREAD

Which would you rather do, get inside a loaf of bread, or put the bread inside of you?

That makes you laugh. But you never tried getting inside a loaf of bread. If you get inside before it is baked, you will find plenty of playmates. Bread dough is just full of little living cells of protoplasm. They eat the bread before you do. They eat and eat and grow, and make millions of other cells like themselves. Let us watch them. They are very active little plants so they can easily be studied.

Your mama buys a yeast cake when she wants to make bread. It may be dry and hard, or it may be a soft paste wrapped in tin foil. It has an odd smell, and does not seem alive at all. Mama isn't sure that it is alive. She takes a half cup of warm water, and a little flour and a tiny bit of sugar and mixes them. Then she breaks her yeast cake into the cup, stirs them all together and stands the cup in a warm place. If you ask her why she does that, she may say: "I want to see if that yeast is alive."

Now you watch it! Soon little bubbles begin to burst. The batter swells and foams, and rises to the top of the cup. Study it with a microscope. The whole mass is in motion. Mama says the yeast ferments, but that is just another name for growing, for yeast plants. There, the secret is out. Mama made a garden. The flour and water and sugar are soil. In the soil she scattered yeast plants—just as a farmer scatters wheat seeds in a field. The yeast is a water plant and will grow in warm water alone, but it will grow faster if given the starch in flour. And it likes sugar, too, just as you do. It uses these things to grow on and, in using them, it changes them. It turns the starch and sugar sour, and gives off the same gas—carbon dioxide—that animals give off in breathing. This gas is what puffs the bread so it rises to the top of the pan. There is very little food in the cup. Soon the yeast plants will stop growing and making gas. Then the paste will fall flat. Mama must hurry and get a big pan full of dough ready, to give the yeast plants more food.

This time she takes a quart of water, and a lot of flour, and the foaming yeast in the cup. She beats the batter with a big spoon to scatter the yeast plants all through the soil and to beat in air, too.

All living things need air, you know. Yeast plants want their food warm just as the baby does; but they grow best in the dark, so mama covers the bread pan. The yeast plant is that little round cell filled with the magic jelly, protoplasm. It likes to float around in a warm bath. In some strange way it soaks food through its thin cell wall and grows larger. When it is grown up, it sprouts another little bud of a cell filled with jelly. Sometimes these buds break away from the parent cell and start a new family, but sometimes they hang together in a little knot or string of cells. The yeast plant has neither stem nor roots nor leaves nor blossoms nor fruit. Each little bag of jelly is a whole plant.

There are a great many plants on earth much like yeast, that you can find and study. One of them likes bread after it is baked.



Yeast, showing single cells and how they grow and multiply by budding.

It is blue mould. Blue mould grows on old bread, and on the top of glasses of jelly. Under a microscope it is very beautiful. It is a feathery mass of delicate blue threads. Black moulds and mildews, rust on wheat, black smut on corn, and puff ball smoke, all belong to the same family of plants. Cells of these kinds of plants are always in the air. You can make a garden of them by leaving a saucer of flour paste, fruit jelly, or a bit of stale bread exposed, for a week or two.

They have a family name. They are called Fungi (fun-ji). The blue mould is often called Fairy Fungi. It looks like a fairy forest. Toad-stools and mushrooms are fungi, too. The fungi all have one very bad habit. They don't earn their own living. They live on other plants, and even on animals. But they like dead or dying things best. Around old trees and fallen logs you will find toad stools and mushrooms. There are two ways in which you may know the fungi. They live on some other living, or dead and decay-

ing, plant or animal, and they are never green. They do not have stems or roots or leaves or flowers or fruit or seeds. Any tiniest cell of a fungus, if put into the right soil will grow and multiply cells, just as the yeast plant does in the batter. It is the very lowest order of plants.

But it became a higher kind of plant when it had to. Fungi like the dark. The first plants were born in the dark of deep sea water. You know earthquakes lifted the floor of the ocean. The



Mushroom, which is one kind of fungus.

plants were lifted, too. As the plants came near the surface of the water they got more light. Do you know what sunlight does to plants? Did you ever find a board lying on the grass? The next time you find one, lift it. You will find that the grass under the board has turned yellow or white. Now, you know that a part of the grass wasn't *born* green and part of it white. The outside

leaves of a head of cabbage or lettuce are green, while the inside leaves, shut away in the dark, are white. Sunshine turns plants green. Nature took as long a step upward as the giant who wore seven league boots, when the first sea plants got enough sunlight to turn green. Green plants were lifted clear out of the fungi class. They began to earn their own living for one thing, and they learned to do a lot of things.

Now, nature might have made one kind of cell and magic jelly for the fungi, and another kind for green plants, but she didn't. She seems to like to see how many different things she can make of a few simple things. All the plants and animals begin to grow in a little cell of protoplasm. So, when we understand the fungi, the simplest of all plants, we have learned the A. B. C.'s of life. Knowing the letters, we can spell the words and read the story of the living world. (See FUNGI, YEAST, MOULD, MILDEW, RUST, SMUT, MUSHROOMS, TOADSTOOLS, etc.)

III. SAILOR PLANTS AND ROBINSON CRUSOES

The first little plants were sailors. As they floated about in the water, the living drop of jelly or protoplasm, soaked food through the thin walls of the cells. One cell budded from another, and broke away to start a new family, or clung to the parent cells in a bead-like string, or in a knot that floated together. Then they budded all around the sides and formed mats and flat net-works of cells, held together by a gelatine in the cell walls.

Some of these nets and mats floated on rocks, in quiet places where the motion of the water was not strong enough to float them off again. As the rocks sheltered them, the plants were not so easily torn apart. The cells that lay on the rocks could not gather so much food, so they learned to cling. The free, floating cells gathered food, and budded and spread into feathery, leaf-like fronds. The plants lived in a colony, you see. So, by and by, they divided the labor just as people do in a village. It was the business of some plants, or cells, to cling to the rocks. Others waved in the water and gathered food. It wasn't necessary, any longer, and there wasn't room, for each cell to bud, although it could have done so. Certain cells began to collect budding material, in little raised dots on the fronds. When these dots ripened they were washed off. These bud dots were spores. They were not seeds, they were just the hints of seeds; and the cells that clung to the rocks were hints of roots; and the cells that spread out and floated were hints of leaves. All together they formed—seaweeds! Seaweeds belong to a family called algae. Algae are higher plants than fungi. But these colonies of cells did not deserve to go into a higher class until something else happened.

Some of these plants were born near the surface of the water where there was more air and sunlight. The sunlight turned them green. A green plant can take raw material like earth, air and water and, with the aid of sunlight, make its own food. Algae are found in oceans, rivers, lakes, ponds, marshes and warm springs, everywhere. Some of them are very beautiful, in a great variety of forms and colors. The very commonest algae that you can all find, almost everywhere, is the green scum that forms on quiet ponds and swamps. Scum is all broken up into single plants, or knots and

strings of cells, and can be easily separated and studied under a microscope.

There were some seaweeds that did not have a chance to become green. They grew far down in the deep sea, under tons of dark, almost airless water. They lay on rocks, flat and motionless and sluggish. They grew slowly but were hard to kill. They learned to live in colonies, to cling, to spread, and to grow spore buds, so they were a little above the fungi. By and by they were lifted, with the rocks they grew on. You know earthquakes lift the ocean floor. Parts of the deep ocean floor have been lifted suddenly into rocky islands. When that happened these colorless seaweed colonies were lifted, too, and shipwrecked in the air. They were just like Robinson Crusoe.

They wanted to live. If you were lost in the woods you would hunt roots and berries and nuts. You would strike stones together to make a spark and start a fire. You would make a bed of leaves in a cave. You would do your very best to live, wouldn't you? Robinson Crusoe was lost on an island a long time. He had to do many things he had never done before, and he changed so much that his best friends wouldn't have known him. If those deep-water seaweeds had been lifted slowly, to the air and sunlight, but still kept under the water, they would have become green algae. But they were castaways on the land before they got far enough along to be algae.

Most of them, millions and billions of them died. But those that died, decayed, mixed with the sand or rock waste and made the first soil that covered the bare rocks. Some of the water weeds managed to live by clinging to the rocks and decaying plants. But, like Robinson Crusoe, they had to learn new ways of living, and they grew to be very different from the algae, their water cousins, and different from the fungi, their ancestors.

For one thing, they became very dry and gray. They spread in broad scales to turn as many cells as possible to the air and rain. But they never turned green. You may find such plants today, on the rocks of the highest mountains, under the snows of cold countries, where grass will not grow, on dead or dying trees and fence rails, and on old house shingles. And, scientists tell us, they are to be found on the deepest rocks in the sea. They are called lichens. (li'kens). Some people think lichens are dry mosses, but they are not. They are plants between the fungi of the yeast and

mildew, and the green algae of seaweeds. They are shipwrecked sailors, who learned a new way of life through many hardships.

Like the fungi, lichens live on other plants. They cannot get their own living. But, like the algae, they have learned to cling, to spread into leaf-like fronds, and to form spores or bud cells. In them is a hint of coming roots and leaves and seeds. They are often beautiful and are always curious. They are generally flat, dry, crinkly-edged scales, colored gray or silver or black. Sometimes, on old tree trunks, they are in thick, fluted ridges, and colored yellow or bright orange or white. With a microscope you can see that the gray scales are powdered with dusty round dots. Those are the spores or bud cells. When ripe the wind blows them, or the rain washes them away.

There is another thing the lichen has learned. Unable to turn green and so make its own food, it often goes into partnership with its higher born water cousin, the algae. It does it in this way. The lichen is made up of a network of thread-like cells. Each mesh holds a little water. Algae spores, floating in the air and looking for water to grow in, find enough for just one cell, perhaps, in each mesh of the lichen. So they promptly move in. Often there are so many algae plants on the gray net surface of a lichen, that they turn it to a soft sage green color, very bright and moist. The algae being green, collect food from the sun and air and feed the lichen, and the lichen covers the algae with a network of gray thread cells to keep it from getting too dry.

Nature makes many partnerships between plants and animals that can help each other. Bees and butterflies help the flowers grow seeds. Men help plants to grow, and make friends of horses and dogs. Isn't it wonderful that, as low in the scale of life as algae and lichens, we should find this water plant and its shipwrecked cousin helping each other? (See ALGAE, LICHEN, CHLOROPHYCEAE, CHLOROPHYLL.)

IV. WATER BABIES THAT LIVE ON LAND

Did you ever see a tad-pole? A tad-pole is a baby frog, you know, but it looks more like a baby fish. It breathes through feather-like gills. You can keep one in a gold fish bowl and watch it turn into a frog. Behind the gills a pair of little flippers pop out. They grow into legs. Then the gills go inside and become lungs. The hind legs come next. The tail grows shorter, and the animal broader. One day the tad-pole is gone. The frog jumps out on a rock and catches an insect for dinner. He sits blinking in the sun as if he wonders how he did it. The frog is a land animal that grew from a water baby. It likes to live on the edge of a pond where it can dive and swim whenever it feels like it.

There are plants something like that. They were born seaweeds or algae. You remember that some of the algae were so near the surface of the water that they turned green in the sunlight, and became able to make their own food? Many of them were lifted slowly, on rising seacoasts until, at last, they found themselves in the water part of the time, and part of the time out in the air. If these algae were to live, they had to jump from swimming tad-pole seaweeds into—not quite, but almost into froggy mosses with legs, and air-breathing lungs. They became those curious plants that we know as liver-worts. Like frogs they can live only in wet places; on tide-water faces of cliffs, on rocky river banks, around ponds and springs and even floating on patches of quiet water in marshes.

He-pat-i-cae is the book name of liver-worts. That is confusing, because there is a little pink flower that blooms in the woods and meadows in the spring, that is called the hepatica. We won't say he-pat-i-cae again, and we wouldn't say it even this once, if you didn't need to turn back to that word in Volume II, page 865, of this book, to see some pictures, and to read more about liver-worts. There, a scientist who has made a study of life in plants and animals, says: "The liver-worts were probably derived from the algae and, in turn, have given rise to mosses and ferns."

Very likely this is the way the algae managed to turn into liver-worts. You remember the algae learned to cling to rocks, to spread into feathery fronds and to grow bud cells or spores. These are hints of roots and leaves and seeds. If you lift a frond of sea-

weed from the water the hair-like cells will all fall together, so they look to be one narrow blade-like leaf. Every time the tide-water drops away and leaves seaweeds out in the air on rocks, the fronds fall and mat together.

After being left out a great many times, some of these frond cells learned to cling together, even when the waves washed back over them. The scattered strings of cells went into partnership and became a leaf. The clinging cells on the underside of the leaf grew into longer, stronger hairs to anchor the plant more firmly to the rock. They learned not only to cling, but to suck up water to feed the cells above. Then the little spore buds raised their heads, and tried to grow into something that would attend to the business of starting new plants better.

Liver-worts look much like very green lichens or very flat mosses, but they can easily be told from both. No lichen is so green and moist, and the smallest mosses have true stems and roots. The liver-wort is just a mat of tiny, flat leaves. One leaf grows out of another, without a sign of a stem. The whole plant is just a thousand leafed mat. The upper side is the stem and leaf and flower, all in one. It is green, and can make food out of sunlight and rain and air. The lower side is white, and from it grows little thread-like, white hairs that act as anchor cables and water suckers. Every leaf that sprouts sends down its own little rootlets below, and grows spore cases on top.

Every part of this flat, mossy little liver-wort is so small that you will have to put it under a microscope to find out how wonderful and beautiful it is. You will find the leaves clearly marked; each a round, flat, green scale with curled up edges, and spotted with darker green. These spots are raised above the surface, and are of two different shapes; but you will never find both shapes on one leaf.

One of these spots looks like a tiny umbrella, upturned and fringed with spun-silk threads. Between the fringes peep little green cups or bottles with balls in them. They look as if they were waiting for something. They are. On the next leaf, perhaps, the raised spot looks like a toad stool with a star shaped top. It starts to grow from the under side of the leaf, curves around the edge, and suddenly stands up straight. On its flat top are little pocket holes.



In each pocket is an egg floating in a bath smaller than the tiniest dewdrop. The egg is full of cells, that are scattered in the water when the egg bursts. Each of these cells has two little whip-lashes that thrash around in the water like wiggly tails. They seem to have minds of their own and to know just what to do. They make straight for the mouths of those bottles on the umbrella spots, whip themselves inside and find the little balls. The ball and the whip lash cell unite, and make spores.

The spores of the liver-wort are not exactly like flower seeds. They are really cases of spores, like the single spore grains on lichens and seaweeds. The plant has taken all that trouble just to be sure there will be enough spores to grow more plants. When the cases are ripe they burst, and the spores are carried on bundles of long threads that snap and scatter them. The liver-wort seems to like to use whips to drive itself along.

What wonderful changes from the simple-celled algae floating in the water, or waving from its rock anchor! The liver-wort has made a leaf; it has dreamed of a root, in its white hair-like suckers; and it has whipped and lashed itself into storing its spore cells into a sort of seed case.

Like the frog that grew from the tad-pole, this water born baby must sit and blink in the sun and wonder how it did it! (See HEPATICA, SPORE, FROG.)

V. PYGMY PLANTS AND THEIR WONDERFUL LABORS

Next above the liver-wort, is a plant that will tell you how to find your way home if you ever get lost in the woods. One of the very first lessons a little Indian boy learned, when he went hunting, was that moss grows mostly on the north side of trees. It does that because the north side is damp and shady. If liver-wort is the child of the algae, or seaweed, moss is the grandchild and the fern the great-grandchild. They all like plenty of water, each one needing a little less water, and able to bear a little stronger sunlight. Each next higher plant learned new things. The liver-wort learned to grow leaves, to send down little sucker hairs and to fill spore cases. Let us see what moss learned to do.

Moss grows from a spore like the liver-wort. It nestles in any damp, shady spot it can find; on a porous rock or the bark of a tree, or on a soft bit of ground. At first it grows little strings of green cells, very much like its grandmother, the seaweed. These lie flat. They seem to be food cells for little brown rootlets that burrow into the soil, and for buds that rise in the air.

It doesn't matter at all which side of the moss-spore lies on the ground. The strings of food cells spread around it; the rootlets go down from the underside, and the buds rise from the upper. Neither the root nor the stem are in the spore at all, only cell material, whose business it is to get food from the earth and the air. The cells on the ground burrow for food, and the upper cells reach for it. The interesting part about moss is that the upper growth does not flatten into a leaf, that sprouts another leaf, like the liver-wort. It grows upward into a little stem, and leaves sprout from the stem. It grows upward, oh, quite a little bit of an inch, budding leaves all around the stem, and finally bears a little seed case on the tip.

Bravo! Don't you feel like clapping your hands? Think how long and hard those little yeast cells full of protoplasm had to work, before they could make the moss plant with a true root, a stem, a leaf and a seed case. But when it has done it moss is still such a tiny fairy plant, and so slender and delicate that it cannot stand alone. You always find the mosses crowded so closely together that they make green plush cushions. This is partly so that the little

plants can hold each other up, and partly too, perhaps, so the spongy matted mass can hold plenty of water. One little moss plant, standing alone, would soon become very dry. If you want to separate one plant from a cushion of moss you will have to melt the earth out in water, until the little rootlets can be pulled apart.

There it is, at last, a pigmy pine tree, with a sort of cone-shaped pod on the tip. This is often called the moss fruit, but it isn't a fruit as seeds of higher plants are. It is a spore case, very much like those of the liver-wort. But here is a funny thing. Moss makes seed first, and then a spore case. The seed is borne on the tip of the stem. It doesn't burst or fall off, or go anywhere. It just begins to grow right where it was formed. It sends a little anchor root down into the mother stem, and a bud upward in the form of a little leafless stalk. (See picture in Volume II, page 1282, *Musci*.) On the tip of the stalk is set a pointed and fringed fool's cap. That is a spore case. Mosses, like liver-worts, grow from spores. The spores make true plants with root, stem, leaves and seed. But the next plants do not grow from these seed. The seed stay on the parent plant, and make spores to grow new plants.

All the strength and cleverness of the moss plant goes into making these spore cases on the tip. (See MOSS CAPSULE, page 1283.) The fool's cap is really only a husk, like the chaff of wheat. Underneath it is a cup, with a curly hair-fringed rim, and a cone rising from the middle. The cone is pitted in regular ray-like rows, something like the tip of a baby ear of corn before the grains come. In these cups are the same little balls as in the liver-wort. On other plants nearby and mosses, you know, so closely crowded together that they seem like one plant, there are other cups in which those double lashed whips thrash around in a bath. You can easily guess what they do, for it is the story of the liverwort all over again. The whip cells find the ball cells, and the two unite to form spores. When the spores are ripe the cases pop open. The spores are carried away by the little hairs set around the rim of the cone.

Having made a leaf, a root, a stem and a seed, what was the next thing to be done? You remember the stem of the moss is very slender and soft. It couldn't grow very high, nor stand alone, nor keep itself from dying. Just as the green cells of algae live in colonies, and so form fronds or feathery hints of leaves, so moss plants live in colonies to protect each other. The next step for these baby plants is to learn to stand alone. See Moss, *Musci*.

VI. HOW THE FERN GREW BONES AND BABIES

In order to stand alone you must have a backbone. And you must have bones in your legs, too. Your bones are on the inside and are covered with muscles. A turtle's leg bones are on the inside, too, but it carries its backbone on the outside. The turtle's backbone is its shell. So you won't be surprised to learn that trees carry their backbones on the outside, in the form of bark. But it took a long time for plants to learn to make bones on the outside.

Did you ever find it hard to break the stem of a field daisy, wild aster or golden-rod? Such stems seem to be made of bundles of tough threads. They are called fibres. The fibres of the flax stem are so strong and fine they are woven into linen cloth. The stem of a fern leaf has so many of these tough fibres packed together that it is like wire. Fibres are strings of cells. Each little cell has a thin wall around it like the yeast cell, through which water can easily soak, and air pass. The plant used these strings of cells at first to soak up food and air, then to cling to rocks, then to make leaves and stems and roots and spores and seeds. Finally she bound them in bundles to help her stand alone.

The fern is nature's first effort to make bones in plants. The fern stem is very slender and bends easily, so easily that the single feathery leaf on its tip, sways in the wind like an algae frond in the water. We often say fern fronds because of this likeness. But they are not fronds. They are true leaves.

There was a time, ages and ages ago, when ferns were the highest kind of plants that grew. For a long time, nature just tried to see how many thousand varieties of mosses and ferns she could make. Most of them have disappeared as higher forms of life crowded them out, but there are still about four thousand kinds of ferns on earth. Some of them are rock ferns, almost as small as mosses; some are as big as trees. You can see tree ferns in the green houses of city parks, and there are whole forests of them in many hot countries.

When the seed of any plant begins to grow, the first little shoot is so soft that you can mash it to a green paste between your fingers. Even a sprouting oak or maple is as soft as that. It has no bark. The cells have not even hardened into fibres. The fern leaf starts

as a little spiral, like a green snail. It does not grow from an upright stem like the moss leaf. It is just as if nature said: "I cannot make a stem strong enough yet to stand up and bear many leaves. So I will just flatten and bury the stem, and make a broader crown. From that a stronger root can burrow into the ground, and many leaves rise into the air."

The stem of the little curled up snail-like leaf is soft and green, but it is quite thick. As the leaf uncurls, this stem seems to stretch, and grow more slender. Slowly it stiffens. The strings of cells that were simply water pipes and lungs, also become bones to hold it up. These bone tubes run right out to the tips of the leaves, growing smaller and smaller, as they have less to support. Then, from the sides, grow ribs, just as your ribs grow from your backbone. The



stem of the fern leaf is a hint of a coming tree trunk; the veins in the leaf are hints of branches on the trunks. The fern leaf is really the far-away promise of a forest tree. Most fern-leaves are deeply parted between the ribs, clear down to the main stem, making branching leaflets. And on the very ends of the smallest leaflet veins, around the edges, the fern leaf bears its fruit, or spore discs, just as the most perfect rose tree bears its flowers and seed pods.

Find a fern leaf that is fully grown, in some shady spot in the woods. All around the edges of the underside, you will find little rusty spots. These are very regularly spaced, so you can easily guess there is some plan. If you look at them through a microscope you will see that they all grow from the ends of the veins, and are connected with the mid-ribs of the leaflet, and those mid-ribs with the main stem. (See FILICALES, Volume II, page 661.) So all those little rusty spots are fed from the root in the ground. The rust spots are only tiny, pin-head grains, that look like a brown powder. But you will find them fastened tight. The microscope shows them to be little brown cases, filled with still smaller grains. These are spores, like those on the liver-wort and moss. Around each spore case is hung a necklace of crystal beads. These draw together, tighter and tighter, until they force the spore case to burst open, and shoot out the ripe spores.

You remember moss first made seeds, and then used the seeds to grow spores, to grow new plants. The fern turns right around. It grows spores first. Then it uses the spores to grow seeds to grow plants. You can watch it do this if you have a great deal of patience, and a good magnifying glass. Take a bit of fern leaf and lay it on a pot full of soft, rich earth. Keep the earth moist and in a dim light. As the fern leaf decays and the spore cases burst, you may see the little scattered spores swell. They are soaking up water. One of them is sure to crack open and show a little white tip. That is a plant cell. Like the yeast cell it has a thin skin, and it is filled with jelly protoplasm. One cell grows out of another, like a honey comb. The cells spread and spread, until a heart-shaped leaf is formed.

The leaf lies on the ground, and it acts exactly like the leaf of a liver-wort. The upper side turns green, while from the lower side little hair-like suckers go down. Then little dots lift up their heads. These are cups and bottles just as on the liver-wort and mosses, too. In one kind of cup is a ball or egg, and in the other kind is the whip lash. The egg is called an ovule. It takes an ovule a certain time to become ripe, just as the egg in a chicken takes time to make a yolk and a white and to put a shell around it. The whips seem to know when the ovules are ripe, for they thrash around in the water in their cups, and finally flash across into the ovule cups. They cling together with a gelatin on the ovule, and grow together into—seed!

The fern seed use that heart-shaped leaf grown on the ground by the spore for food, and begin to grow right away. They sprout just like all true seeds, sending cells down for roots and up for leaves. The crown of the root is the buried stem of the plant. In the leaf stems the cell walls lengthen and stiffen into woody fibres. In some way that no one understands, the air and water pipes of the plants learn also to do the work of bones strong enough to support long feathery leaves. Besides, the fern is the first plant that grew from seeds. The mosses make seeds and then go back to spores to make new plants, but the ferns make spores first, and then seeds to grow plants. After the ferns, plants had no further use for spores. Having learned how to make seeds they **all make them** directly. Seeds are embryo, or **unborn baby plants**. The fern took two steps forward. It made leg and arm bones, and it made seed babies. (See FERNS, FILICALES, SEEDS.)

VII. HOW FAIRY FUNGI TURNED INTO A DANDELION

That was a great day in your family when you stood alone for the first time. It was just as great a thing in the plant world when the first fern leaf lifted on its slender stem and stood alone. Its little bones were still very soft and weak and tender. But see how long it took Mother Nature to get up to the standing alone stage of plant babyhood.

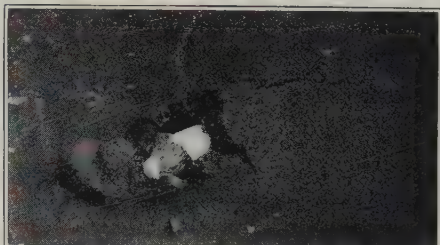
Everything in nature, among plants and animals, grows slowly, just as a baby does. It takes a baby a year to grow strong enough to stand alone, sometimes. A further time is needed for baby to learn to walk, and twenty-one years for him to grow to a man. After she made a fern leaf stand entirely alone, on a very uncertain, wobbly stem, it took thousands of years, through many, many, slow changes, to make a tree, with a stiff trunk, with stout bark, many branches and leaves, and the perfect flower and fruit.

In every upward step taken by plant life there is a story, just as interesting as the stories of the cell, the fungi, the green algae, the liver-worts, the mosses and the ferns. It would take a big book to trace all of these steps. We cannot do that here, but we can follow the big steps, in one short chapter, so you may always know in what very large class any plant you may see, belongs.

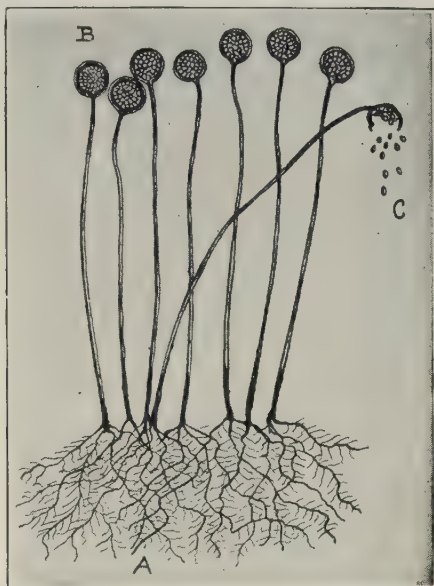
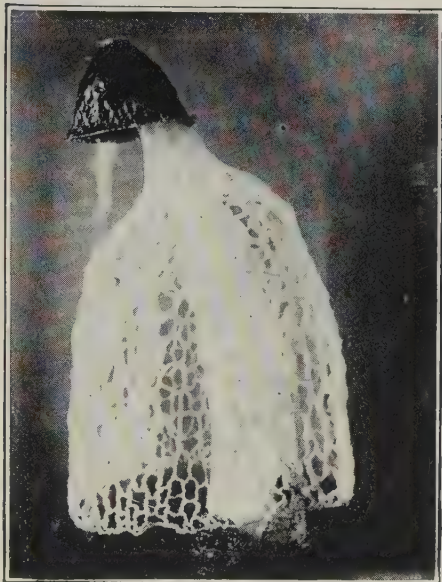
For a long, long time, Nature just made larger and larger ferns, with taller and stiffer stems that were able to hold up a great number of leaves. At last she made tree-ferns, with tufts of leaves on the tops. These plants have no flowers, but bear single, naked seeds. Next, Nature seemed to learn to put a number of naked seeds on a spike or cone. There are two branches of this family, the pines and the palms. In many ways they are alike, but in some they are quite different. They both have a tall stem, made up of bundles of straight fibres. In the palm this trunk does not branch. In the pine the branching is high and scanty. Both have straight-veined leaves.

You know the clusters of needle-like leaves of the pine, don't you? They are not so very different from the fan-leaf of certain palms. There are many varieties of pines, or what we know as evergreens, or cone-bearing trees. There are the spruees, the hemlocks, the cedars, the cypresses, yews and firs. The giant

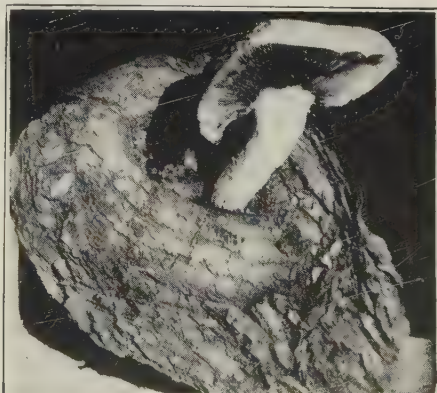
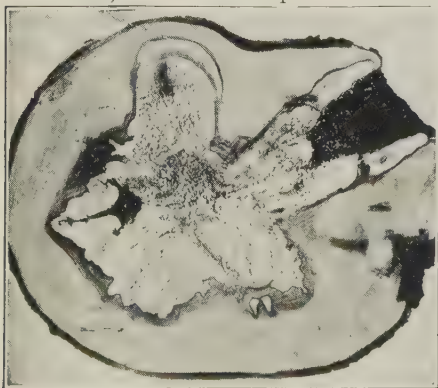
SOME PRANKS OF FAIRY FUNGI



This lady is sitting beside a "vegetable sheep"—a huge fungus of New Zealand. On the right is a photograph of a fungus which broke through a weak spot in an asphalt pavement. What is called "growth pressure" is known to reach 20 atmospheres, or 300 pounds to the square inch.



This curious fungus is found in the jungles of Java. It is called the "net bearer." Why? The illustration on the right shows how the common fungus grows—"A" roots; "B" fruit; "C" how the spores are scattered.



Here are two ways in which the fungus attacks and helps to destroy our beautiful trees.

redwoods of California are cone-bearers, too. They all have straight-grained, soft wood, and bear their seeds in scaly cones. Each hard, woody scale of a pine cone bears a pair of naked seeds. These seeds are one-leafed, like a grain of corn. That is, the new plant grows from one side of the seed. In higher plants, like peas and beans, the seed split into two leaves.

The palm, in some ways, is simpler than the pine. It has less bark, and its stem does not branch. Its bark often seems to be mere bundles of loose, dry fibres left by leaves that fell as the stem grew upward. These leaf scales are easily stripped off, and the fibres are so long and strong that they can be woven and twisted. They hint at true bark. The flowers of palms are borne on a fleshy spike at the top, between the cluster of feathery leaves. They are small and green, as in the pines, and do not look like flowers at all. The seeds of palms and pines form very much as they do in the fern, but the little whip-lash turns into yellow grains of pollen. The making of pollen was a big step forward. Pollen grains can be carried like dust on the wind, to more distant plants. Sometimes, in the desert, the pollen of date palms hover like a yellow mist over the trees. You can see this yellow dust in pine woods in the spring. It has a spicy smell.

The pines and the palms are very useful to men. The pines furnish many building woods, tar, turpentine, resins and gums. The palms furnish food in dates, cocoanuts, sago (a starchy pith), sugar, oil from palm nuts and cocoanuts, dyes, gums, building material and fibres. In pines and palms, nature made plants of very much longer life than she had ever made before. Some giant red-woods of California are known to be hundreds of years old. The highest of the cone-bearers have very strong, thick bark and show rings of yearly growth in their wood.

Next, nature began to cover her seeds. The seeds were still single leafed, and the leaves straight-veined. She began to make ribbon-like leaves growing at regular distances on stems. Any little grass plant is an example. How many ribbon-leafed plants can you think of? Wheat, oats, rye, rice—yes, all the cereal grains, from grasses to the tall, wide, banner-bladed corn stalk. Sugar cane belongs to this family, and your bamboo fishing pole. Water flags, rushes and cat-tails belong to it, too, and onions, lilies and other bulb plants. In the bulb plants the stems are crowded into round fleshy crowns that are often buried. And they bear beautiful flowers.

All these plants, too, have single-leafed seeds. Plant some grains of corn. After they begin to sprout pull them up, one every day and watch them grow. The plant sprouts from one side of the grain, always. The first shoot looks like a blade of grass rolled from one side to another. The leaf and stalk veins lie side by side in long straight lines. The plants have no true bark, or rings of growth. Most of them live only one season. Their seeds are fertilized by pollen carried by the wind, as in palms and pines, and like them are borne on stalks or spikes. A head of wheat or an ear of corn is something like a pine cone, but the seeds are covered and protected. This class of plants gives us a great variety and quantity of grain foods, for men and animals and birds.

Last of all, Nature made plants with the two-leafed seeds, net-veined leaves, hard-wood stems that always show rings of growth, stiff bark, beautiful flowers and fruit. The very earliest of these still have wood only a little harder than pines and palms. And they bear their seeds on soft, feathery, or furry cones or spikes. These are the willows, alders and poplars with their tassel-like catkins. Far above these are the crown-bearers, or true flower-making plants. These are the orchard trees, rose bushes and strawberry vines, with their loose, gaily colored, fluttering petals. Their seeds are not only covered, they are often buried in fruit pulp, or hidden in pods and shells.

Very likely you think the crown-bearers are the highest of all plants. That is because you think of them as the most useful to human beings. But they are not more useful than many of the grasses and palms. By "highest" in plants and animals, is meant those that are most useful to themselves. It is the first business of every living thing to eat and grow and reproduce itself. Those that can do these things best, that can live and grow under the hardest conditions, and that can make and scatter the greatest number and hardiest seed, are the highest of all.

So, above the crown-bearers are the funnel flowering plants of the morning-glory and clover. And above them are the composite flowers that live, great numbers of them, packed and crowded into one flower head, like people in a city. These are the daisy, the sunflower, the chrysanthemum, the aster, the purple-headed thistle, the—guess! A little flower with a gold crown on his head—the common yellow dandelion!

If you don't believe it open a dandelion head in full flower. Split the green cup down one side and spread the head open. See

the tiny stems crowded in that cup, like flowers in a vase. Every yellow petal is a funnel that is folded around little seed-making hairs and knobs, powdered with yellow pollen grains. Try to count the ripe seeds on a gray, gauzy globe of dandelion. Watch them fly and scatter in the air. The seeds are not only well covered, but they have feather wings. You know how hard it is to kill dandelions out of grass. If you cut off the tops, new tufts of leaves spring up. If you dig out the roots some rootlets or root-tips remain to start new plants. And every flower head grows and scatters dozens of seeds. The thistles are just as bad. This family gives us some beautiful flowers, some plants that are useful, but a great many that are troublesome weeds, that we have to rout out year after year. Of all the plants those that bear composite flowers make the best fight for life, and win out under the hardest conditions. So they are the highest.

So you see how the single yeast-cell, that is born, grows to full size, sprouts a new bud and dies in a moment of time, has developed into the hundred-flowered, tough and stubborn, yellow dandelion. See GYMNOSPERMS, CONIFERS, PALM, DATEPALM, GRASS, WHEAT, OATS, RYE, RICE, BARLEY, CORN, PLATE OF CEREAL GRAINS, Volume III, page 1650, BAMBOO, sketch of Filipino in "Travel Stories" for uses of bamboo, LILY and other bulb plants, MONOCOTYLEDONS (single-leafed seed), DICOTYLEDONS (two-leafed seed), COMPOSITAE, DANDELION, THISTLE, etc.

VIII. WHY PLANTS ARE LIKE SQUIRRELS

Did you ever see a squirrel gathering acorns and nuts in the autumn? All summer long squirrels eat their food as they find it, bring up their babies, grow fat themselves and play a great deal. But when the first frost sends the nuts rattling to the ground, they know winter is coming. So they lay away a good store of food, in some safe place, to last them through "hard times." Wise little brother of the tree tops! How busy he is, and how hard he works!

Plants are just like squirrels. They eat and grow all summer, feed their flower babies until they are ripe seeds, then they store food to last them until the Spring. It is not so easy to catch plants at work, as it is to catch squirrels, but if you have very sharp eyes and minds you can do it. All plants above the fungi, earn their own living. In all green plants the roots get food from the earth, and the leaves get food from the air. The two kinds of food come together in the leaves, and the sun mixes and changes them into plant cells.

In the story about water you learned that water never runs up hill. Then how does water get from far down in the ground to the top of a tree? It doesn't *run* up; it is *pumped* up. Get a basin of water. Hold your handkerchief so just the hem on one side of it is in the water. That becomes wet at once. Hold it there. See the water climb, thread by thread! In a little while the handkerchief is wet to the top. You know a wet piece of cloth dries rapidly in the sun. As the water in the handkerchief passes into the air as vapor, more water is drawn from the basin. After awhile it is all soaked up. The basin is empty, and soon afterwards the handkerchief is dry.

This drawing of water up by threads, is called capillary attraction. A lump of sugar has it. Hold a lump of sugar with one tiny corner of it just touching the top of a cup of coffee. Soon the whole lump is brown and wet. A plant is like a big handkerchief full of threads that run from the root hairs to the leaves. The sun draws the water, in vapor, from the leaves, and more water is pulled up just as long as the roots can find any in the earth. Those little wood-fibers that you

found in bundles in the stems of fern leaves, are not only bones, they are blood vessels, too.

Those little tubes are so small that they cannot carry anything but liquid food. The sap of trees looks like clear water, but it has a great many things melted in it. The sap of maple trees has sugar. Some saps are puckery, some spicy. In the earth are many things that melt in water. Water will take up and hold, salt, sugar, lime, iron and many minerals. When clear well water is boiled in a tea-kettle, it coats the inside of the kettle with lime. If you melt salt in water and then put it in the sun, the water will pass away as vapor, but the salt will be left in the glass.

Minerals will not burn. If you burn wood you have a little heap of ashes left. The ashes are the minerals that were in the wood. Plants do not like rain-water as they do well-water. They must have water that has gone down into the earth and taken up minerals. That is the reason why plants are so made that they get all their water through the roots.

You might think that plants drink the rain that falls on their leaves and stems. They don't. They merely use rain to wash their faces. They need to wash the dust out of their skin pores, just as you do. Ask them if this is not true. Leaves will talk, as they are supposed to do in fairy stories, if you know their language. This is one way to ask leaves if they drink through their leaf-pores, or through their roots.

Take a leafy branch. Lay it across the mouth of a jar of water, so some of the leaves dip into the water. In another jar put the stems of leaves in the water. These stay fresh several days, and drink the water, as you can see by the smaller amount in the jar. The others soon wilt and wither, and do not use the water in the jar.

The work of the leaves is to do the air-breathing for the plants. They do it just as you do, through lungs. Their lungs are more like the pores of your skin. There are little open mouths at the ends and crossings of the little tubes that come up from the roots. In net-veined leaves, like the rose and apple, they are scattered over the under surface. They open little mouths, breathe out the vapor of the water from the roots, and breathe in the air.

The leaves are little plant-food factories. In them they have water and minerals from the roots, and oxygen, nitrogen and carbon-dioxide from the air. Oxygen is a purifier. We use oxygen to purify the blood in our lungs. Carbon is the wood-fiber maker. It

is that solid part of a plant that makes a bright fire. Coal is nearly all carbon, and coal you know was made of plants pressed to a kind of stone. Nitrogen is a plant food. The roots get some of it out of the earth, and the leaves get some out of the air. Nitrogen is what is left when the oxygen is burned out of the air. (See AIR.)

A leaf is very thin. The sun can shine right through it, for the cell walls or skin is as transparent as glass. In some way sunlight mixes with the water and minerals from the roots and the oxygen, from the air, and makes green plant cells. The clear, unused part of the water is drawn away in vapor, and most of the oxygen is given back to the air for animals to breathe. The carbon is laid away in the plant cells. The nitrogen is sent clear back to the roots to make nitrates, before the plant can use it. Clover draws a great deal of nitrogen from the air, to make this plant food.

The new plant food made in the leaves is sent back to all the growing parts of the plant where it is needed. Some of it stays in the leaves to build them larger. Some goes into flowers, fruit and seeds. In grasses and straight-veined plants without bark, the new plant food goes to every part. But in plants that grow by adding a new ring every year, the green cells form a layer between the old wood and the bark.

You can find this soft, green layer under the bark of a rose bush, or the twig of an orchard or nut tree, in the spring. It loosens the bark so it can easily be peeled off. That is why you can make a willow whistle in the spring, or peel a little switch. The new green layer makes the heart wood just that much larger, so the bark has to stretch to fit it. You know your skin stretches as you grow larger or become fatter, doesn't it? Maybe this stretching, year after year, is what makes the bark on hard wood trees crack in long deep ridges.

All summer a plant is busy feeding itself, growing and bringing up seed babies. But in the fall the leaves close their mouths and stop pulling up water. They know hard times are coming, when there will be little water to draw upon. So they must stop giving water to the air. They seem to rob themselves of the food they no longer need, and to send it all into ripening seeds, into the roots, and into next year's leaf-buds that form at the base of the leaf stalks. Food for the seeds, when they begin to grow, is stored in fruits and nuts, into thickened stems like lily bulbs, into tubers like potatoes, and into grains of corn and wheat. Everything is done to keep the plant alive over the winter, and to give it a new start in the spring.

When you see bare, leafless trees blowing in the winter gale, and often loaded with snow, they look dead. But they are only asleep, like the squirrel and the bee, with their food safely stored away. On any bit of twig you can find little brown knobs and points, often smaller than wheat seeds. They are next year's leaf and branch and flower buds. They are rolled tight and wrapped in fur and spicy gums, to keep out the cold and water. In the first warm days, in February or March, these buds swell. If you break off some twigs of willow or lilac, and put them in a jar of water in a sunny window, you can watch them burst into green leaves and branches and flower buds.

Like the squirrel, the plant stores its food for winter, and it pops out of its hole and goes to work again, just as soon as earth and air and sunshine say:

"Wake up, children, spring is here."

And some trees, like the willow, alder and poplar, even whisk their saucy little catkin tails in the air, just like squirrels.

IX. PLANTS HAVE VISITORS AND TRAVEL ABROAD

What a great thing it is for little boys and girls to have play mates. How many more things you learn to know and to do, and how much better a time you have, if you play with others. It is best of all to have some one who has lived in a very different place, and in a very different way from yourself, to play with.

Do you live in the country? And have you some little cousins who live in a city? Very likely they visit you in the summer. What a treat it is to them. A farm is a strange, delightful land to a city boy. How many wonders he sees, and how eager you are to explain them to him. Then you go to the city to visit, and you see enough new things to talk about for weeks. It is a good thing to go away from home, and to have visitors. Moving about and mixing with people brightens us all wonderfully, and makes us change some of our ways of thinking and living.

It is just the same with plants. Plants that live by themselves, and do everything for themselves, are like hermits in caves. The liver-worts, mosses and ferns are sort of hermit plants. Palms and pines and grasses travel a little. Their pollen grains take journeys on the wind, and visit other plants. They begin to change then. There are thousands of varieties of the higher plants.

As plants cannot run about to make new acquaintances, like little boys and girls, they need messenger boys to carry letters. They use the wind, the bees, the butterflies and the birds. By these winged messengers they exchange gifts with their friends and neighbors and relatives in distant fields, just as we exchange gifts at Christmas. Let us see just how they do it.

You have often noticed the grains of yellow powder on little upright threads in the hearts of flowers, haven't you? They are very plain in roses, in the blossoms of fruit trees and buttercups, and many common flowers. Perhaps some one has brushed a buttercup under your chin to see if you like butter. If you do that yellow dust rubs off on your chin. It is so loosely fastened, in some flowers, that you can blow it off. That yellow dust is pollen. Pollen is one of the things the plant needs to make seed. The other thing is an egg.

DO PLANTS HAVE "FEELINGS" TOO?



YOU know how your legs kick when someone tickles your feet. So all living things, including plants, respond to touch, but some, like the sensitive plant, show their "feelings" more than others. Chloroform has the same effect on plants it has on people—after taking it they stop "showing their feelings." Some plants get food by closing their leaves on insects that touch them. In the circle is a leaf of a big pitcher plant that grows in California and catches insects in its pitchers. Notice the flange that guides the insect into the pitcher.



This man is chloroforming a sensitive plant. On the left is the Trumpet Leaf—a plant that catches ants—and on the right the Huntsman's Cup, that "eats" cockroaches.



The Venus fly trap has leaves like jaws that snap up insects touching them. On the right is another kind of pitcher plant. The picture shows how its pitchers full of sweetened water are kept open to attract insects. (See SENSITIVE PLANTS AND CARNIVOROUS PLANTS.)

Do you remember the little balls and whip lashes in liver-worts, and the way in which the whip thrashed about in its bath cup and jumped to the ball? By the time plants grew into pines and palms and grasses, the whip lash turned to pollen grains, but the little ball remained much the same. It became an egg, packed away with others in a seed-case.

The egg always lies quietly in its case. Cut a ripe apple across the middle and see what a nice seed case it has. The egg has to stay where it is formed, and wait for the pollen to come to it. In the apple blossom there is a circle of pink petals. Those petals are not the flower at all. They are only the party dress the flower puts on for company. The real flower is in the center of the pink petals. In the very middle is a tiny white column, that swells out at the top into a spongy, moist button like a little dog's wet nose. This button often glistens as if it had a dew-drop on it. The column goes down to a knob hidden in a green cup, below the pink petals, and swelling out from the stem. In this knob are the eggs in a nest. By and by the pink petals will fall off, and the green knob will swell and grow and ripen into a juicy apple.

That is, it will do so if something happens in blossom time. The little column that rises from the seed case, and that has a spongy wet button on the tip, is hollow. It has a fairy tunnel in it. All around the column is a ring-around-a-rosy of little white hairs, with the yellow pollen grains on them. Those grains are so loosely set that a baby breeze fluttering the pink petals against them, or a blundering bee or butterfly in search of honey, brushes them off. Some of the pollen is sure to be brushed onto that little button in the middle when—down they go! The yellow dust sends a tiny rootlet on a toboggan slide down that tunnel, right into the eggs. When the two unite, they form a seed.

If that was all there was to it, it would be very simple. Every plant could make its own seeds, and wouldn't need any neighbors or relations to help it. But sometimes flowers have the eggs but no pollen. You can find a great many strawberry blossoms with the little button-topped column, but no yellow food for the eggs at the bottom of the tunnel. These imperfect flowers must always be planted among perfect flowered kinds of strawberries.

And sometimes, even when flowers have both of the seed making materials, they cannot unite them. The egg wants pollen from some other plant. It doesn't want the help of its brother in making seed,

but of its cousin. A Bartlett pear wants pollen from another variety of pear altogether. Fruit growers know this and plant different kinds of pear trees in an orchard. If not too distant, the pollen will find the eggs that need it.

So, in blossom time, there is a great deal of blowing about and visiting and exchanging of gifts between flowers. They seem to be amusing themselves; tossing their pretty locks, swinging their silken petticoats in the breeze, and gossiping with bees and butterflies about what is going on in neighboring fields and orchards. One can fancy a little sugar pear tree saying to a bumble bee: "Put some of my nice yellow pollen on your legs and take it over to Mrs. Bartlett, with my compliments. I'm sure it's what she needs for her little seed babies. Just press the button and she'll do the rest."



CORN PLANT

From the tassels at the top of the stalk the pollen falls on the silk at the end of the ears which are sprouting below.

Isn't that friendly? The plant world is very busy and helpful when it seems to be playing. The tall, plummy tassels at the tops of corn stalks, swing much as you do under the maple tree. But those tassels are so loaded with pollen that you can often see a brown dust hovering over a corn field. As the wind blows the tassels, the pollen is shaken down in clouds. It falls on the corn silks below. Each one of those silks goes back to little eggs on the baby cob. A pollen grain must fall on the hollow tip of each silk, and slide a hair root down the long tube to the egg, or there would be no kernels, or seeds, on the ear of corn.

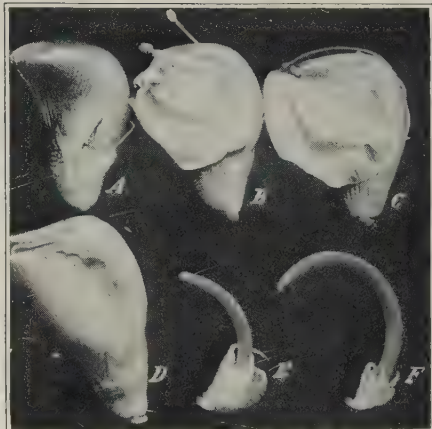
The wind is the only messenger of the pines and palms, the grasses and grains, and many of the straight-veined plants. The lilies and other bulb plants of the straight-veined family, have bee and insect visitors. Nearly all of the net-veined plants have such sweet blossoms and fruits that bees and butterflies visit them. When fruits and seeds are ripe the winds blow them abroad, the birds eat them, fly far away, north and south, sometimes hundreds of miles, and plant the seeds in other countries. In this way plants were scattered long before men began to grow them for food. The soil and rain and sunshine were not always the same, so plants had to change. Many varieties of palms and pines, grasses and wild fruits were made. The plants that traveled and had the greatest number of visitors, changed the most.

WHY "JACK" GETS HIS FACE WASHED

WHEN a bee pokes her nose into an alfalfa blossom she trips the stamen, which jumps up like a jack-in-the-box and scatters pollen on her breast; this she rubs against the sticky end of the pistil of this and other alfalfa blossoms and so fertilizes them. To produce new



varieties, Uncle Sam's experts do this tripping with a pin and wash off the pollen with a rubber bulb such as dentists use, so the flower cannot fertilize itself. Then pollen is applied from the flower of the plant with which the crossing is to be made.



A and B, before and after tripping; C, held by pin; D, after washing; E, after pollinization; F, pin removed. Picture No. 2 shows how the sweet pea (A) is crossed by the removal of stamens (BC); D, after fertilizing; E, second morning; F, third morning.



Lettuce flower pollen can be removed with a small rubber tube attached to the garden hose. Such flowers as the single rose are easily crossed by the water method or by removing stamens (Sta.) and applying pollen to the pistil (P).

X. HOW PLANTS ARE PROMOTED TO A HIGHER CLASS

A long time ago people thought that flowers were given their beautiful colors and perfumes just to make the world a pleasanter place for people to live in. But now we know that everything lives for itself. It lives to eat and grow and make seeds of its own kind. No doubt, flowers have found out that men and women and little girls and boys are very good friends in helping them grow. They want all the help they can get, so they put on pretty dresses, and use perfumes to coax bees and butterflies to visit them, and they offer cups of honey to their little brothers of the air, so they will come back again.

When we see a flower it seems to have got so far away from the little cell full of protoplasm, or magic jelly, that we cannot understand that they can be made of the same things at all. But the little cell has the same power that the most beautiful flower has. It can take lifeless matter out of the air and water, and make living things out of it. And it can change. Lifted into the sunlight some of its cells turned green. Thrown out on the land, the cells clung and spread into a leaf and sent down rootlets. As the cells could no longer break away and float to start new families, it grew spores and used the wind to scatter them.

Plants changed first by dividing the cells, then by budding new ones, then by uniting different kinds of cells to make spores. In doing these things it learned to break up air and water and put them together in new ways. It learned to divide the work of the plant by making organs—roots, stems, leaves, blossoms, fruits. The lowest plant is a cell, but the highest is only a multitude of cells made of the one material—protoplasm, but changed into many forms and given many kinds of work to do. From using water alone to float in, the plant learned to use earth, air, wind, insects, birds and men, to help it make and scatter its seeds, and to grow better plants.

When you go into the fields and woods in the spring to gather wild flowers, haven't you found some blossoms larger, more perfectly colored and with a sweeter perfume than others? No two violets are just alike. Some are small and pale, others large and blue and fragrant. In the plant world it has always been like that. And the stronger plants always have the best chance to live. They have

better soil, or more room to grow in, or more sunshine or, something that makes them better than their brothers and sisters. So they have a chance to make better seeds. The weak plants die more easily. This is nature's way of picking out the best.

Among the flowers there were some born with deeper little pockets, so the insects could not get at the honey without covering themselves with pollen. So these flowers kept more of their honey for their own use, and made the bees and butterflies scatter their pollen. The kind of flowers that spread their honey, or that had pockets that were easily "picked," died. The flowers that have the stronger perfume have a better chance, too, and those that have attractive colors.

Suppose a bee goes after honey in an apple blossom. It likes the color and the smell. So it goes to another apple blossom and another. It doesn't visit anything but apple blossoms until it goes back to the hive. Just why it does this we do not know, but very likely bees and butterflies are much like little boys and girls. When they get a taste of anything good, they like to make a meal of it. Once a little girl was asked why she didn't eat bread with her jelly. She thought a moment and then said, soberly:

"The dolly is dooder."

Maybe that is all the answer the bee could make. For the time it has the color and smell and taste of apple blossoms, and that seems "dooder." The next time it comes it may blunder into a head of clover. Then nothing but clover will satisfy it. In this way insects are kept from mixing the pollens of different plants. The traps and tricks that flowers have learned, to make the insects scatter their pollen, is interesting. Some have hair nets over the honey cups to hold the little visitor until, in his struggles, he rubs the pollen from his legs, onto the little wet buttons on the seed tube. Then they give him a little honey and let him fly away.

You didn't know, perhaps, that some flowers are so much better than others of the same kind that they really are a little different. You know it is like that in human families. Lincoln was better than and different from all his own people and his neighbors. So was the poet Shakspeare, and the poet Burns, and Daniel Webster and Washington. Men who have studied plants find some with a genius for going up higher.

One day a man like this was walking in a field of yellow poppies, in California. Yellow poppies grow wild there. There were acres and

acres of these poppies, as yellow as gold. Suddenly he saw one blossom that had red stripes on its petals. He tied a label on the stalk so he could find it again, and left it there for the seed to ripen. He gathered these seed and planted them in his garden near some red poppies. When the two blossomed he took the pollen from the red poppy on a camel's hair artist's brush and, as lightly as a butterfly, put it on the seed button of the striped blossom. The seed from that, the next year, grew into big, crimson flowers.

The name of this plant wizard is Mr. Luther Burbank. He has made big, snow-white, double-petaled Shasta daisies from the common field daisy. He has grown white blackberries, and stoneless plums, and thornless cactus that cattle can feed on in the desert, and many other plants. If you ask him how he does it he will say, modestly, that he finds a plant that wants to come up higher, and he helps it a little, just as a rich man or a church will sometimes send a very bright, ambitious boy to college.

Farmers help plants come up higher, and get better and different varieties of seeds all the time. They plant the largest seeds from the biggest, fullest ears of corn, and the best filled stalks of wheat. They take the smoothest, mealiest potatoes with the healthiest eyes. And they change the crops grown on a field. Wheat and cotton and certain other crops use up the plant food in the soil, if they are grown year after year in the same fields. So clover is planted to make nitrates for the soil. Flowers really do want us to look at them and smell them, just as they want the wind to blow on them, the bees and butterflies to visit them, and men and birds to eat their fruits. If we love them and find them useful to us, we help them grow and change.

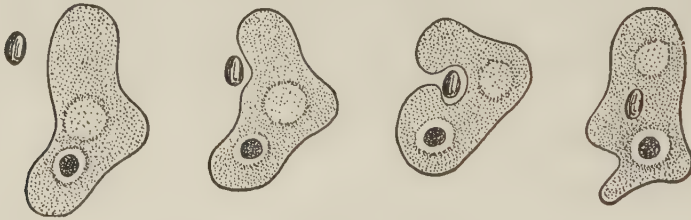
The old, old call of "come up higher" is still sounded in the woods and fields. Older people can remember the first navel oranges without seeds, and the big Burbank potatoes. Every flower show has some new and more beautiful rose or chrysanthemum; every new spring seed catalogue its new colorings of sweet peas and nasturtiums. Any little boy or girl with a tiny garden, can watch for some flower with a poet's gift for size, color or perfume, and help it "come up higher."

PART II—ANIMALS

I. THE LITTLE ANIMAL THAT WALKS WITH ITS STOMACH AND EATS WITH ITS FEET

Don't you like the menagerie part of the circus best? And the "Zoo" in the city park? Wild animals are so strange and interesting. In every pond and creek there are animals that are just as strange. You don't have to buy a ticket to see them, as you do for a circus. But you can see a great many more of them, and all of them a great deal better, if you have a good microscope. Some of these little animals are wonderfully small, as well as wonderfully made.

The lowest forms of animal life, as of vegetable life, live in the water. The very, very smallest animal is just a single cell, too small for you to see without a magnifying glass. The yeast plant, you



AN AMOEBA FEEDING

In first figure a bit of food lies near it, in second figure it draws near the food, next it stretches around it and then it swallows it.



The first figure shows how the amoeba changes into a solid mass if touched, and the last two figures show the amoeba dividing so as to make two.

know, is alike all over, and gets its food by "soaking it in through its skin."

One of these single-celled animals is called the amoeba. That is a Greek word that means "change." The amoeba can change its shape whenever it wants to. If you could put on a pair of wings as easily as the amoeba can make feet, you could do what every boy has wanted to do—fly like a bird. Whenever the amoeba wants to move in a certain direction, little legs push out from that side of its body and draw the rest of the amoeba after it. Whenever it wants to go in another direction it draws in these legs and makes legs on the other side.

But when it wants to eat it doesn't make a mouth, and put food in this mouth, as you might suppose. Whenever it touches the food on which it lives, it simply wraps itself around it like a little boy trying to carry a big watermelon.

It looked very odd to see the hair-like growths of the flower cup close around the bee and make it give up as much of the pollen on its legs as the plant wants, before letting go. It looked as if even flowers could think sometimes. So the little amoeba acts as if it could think, too. It seems to have ideas and tastes just as we have. Not so many ideas, and not so many tastes; but you would hardly expect that of an amoeba, would you? An amoeba is thousands and thousands of times smaller than we are—hardly a hundredth of an inch across its little body. Just think what might happen, if we were as many times brighter than an amoeba as we are times larger!

For see what it does:

If it wraps itself around a piece of food that is too big for it—if it "finds its eyes are bigger than its stomach" as little boys do sometimes—it just unwraps itself from the food and glides away. Sometimes it seems not to like the taste of things, for, having wrapped itself around something, it holds it awhile and then lets go of it again without eating it. Some of the little animals it eats have shells. When it is through with one of these it unwraps itself and drops the shell.

And it seems to have nerves, too. Of course we can't tickle its feet because it hasn't any except those that it makes when it wants to go walking. But if you touch it, or shake it, it pulls all of itself in, making itself into a little round drop of jelly.

You have often noticed how an earth-worm, or fishing-worm, as you call it, will shrink when you touch it. This shows that the earth-worm has "feelings," too. It has something that answers

for nerves. We couldn't get along very well without nerves because it is through them that we know what is going on around us. Nerves are just as necessary to make things go right inside of us. It is by means of the nerves of the eye that we see, the nerves of the ear that we hear, the nerves of the tongue that we taste.

As the cells of plants change into roots or leaves or bark, when leaves or roots or bark are needed, so all the different parts of animals, from the amoeba up to man, have been made to grow by the work they have to do. The amoeba uses all parts of itself for the same purposes. There is no part that always does the walking—so it has no legs or feet. The legs and feet which the amoeba makes, as it wants them, are called "false feet." It has no stomach that always stays a stomach, because there is no part that it always uses to digest its food.

There is a little animal called the "moneron" which is still lower in the scale of life than the amoeba. For one thing it hasn't any skin—this moneron. Inside and outside it is just the same. The amoeba has a kind of a skin on the outside, and a little hollow place on the inside, which serves both as a heart and lungs, distributing the food and oxygen from the water throughout its body. The oxygen which it needs comes out of the air just as does the oxygen which we need. You know there is air in the water.

Next above the amoeba are little animals called in-fu-sor'ia. These, under the microscope, look like caps or bells, with little hairs all around them. They remind us of the little whips that help to make the spores in the liver-wort, as if to say that plants and animals are related. These infusoria go thrashing around in the water just as the whip-tailed cells of the liver-wort do, using the hairs to swim with, just as the liver-wort cells uses these whips. These little hairs *stay* little hairs, and are not drawn back and changed into something else, as are the feet of the amoeba.

Still higher up are other little animals that look something like these, but in addition to having these little hairs to swim with, they have mouths that stay mouths all the time. In these little animals part of the hairs are used like oars to swim with, and those around the mouth are used as hands, fanning other little animals into the mouth.

Now don't you believe that, in a pool of standing water, there are just as wonderful animals as in a circus? And don't you see, also, that in the animal kingdom, nature begins spelling out her

wonderful story, in little easy words of one syllable, just as you learned to read when you began with the primer:

"It is a c-a-t."

Only, when we read the Book of Nature we can't begin with the cat; she's away up in a higher grade, with the fish and the birds and boys and girls. *She* has a backbone; and these little animals in the pond menagerie haven't any bones at all!

Your big brother or sister who goes to high school, can tell you more about the amoeba and other simple forms of life. Or, if you have a very fine microscope, he can show them to you. You may find amoeba on the dead leaves in the bottom of pools, or in the home or school aquarium, or on the roots of duck weed and other small water plants. You can also put some hay or straw in a glass jar filled with water, let it stand a few days in a warm room, and get specimens of another kind of one-celled animals. Then you can watch them through the microscope. See AMOEBA, page 64; BIOLOGY, page 212; PROTOPLASM, page 1554; PROTOZOA, page 1554; INFUSORIA, page 925.

II. WATER BABIES THAT LIVE IN A VILLAGE

If the amoeba is ever to get up in the world very far, it must stop using all its parts for everything. The first little creature to make a stomach on the inside, you know very well. Or, rather, you know his empty house. A sponge is the skeleton, or bony house, where hundreds and hundreds of little animals once lived. They all live together so they can help float food to each other's mouths. You know a sponge is full of holes. These holes are long, crooked water streets of the bony town. Other sponge colonies live in glass towns. Those are very beautiful.

Bath sponges are a kind of elastic horn. Elastic means that it will stretch, like rubber. When you fill a sponge with water and squeeze it out, you make it do over again, in a way, what it does when every room in it has living baby tenants. The sponge lives by having water flow through its village. But, instead of soaking up the water and squeezing it out, the water is paddled through the little streets, by little hair-like arms.

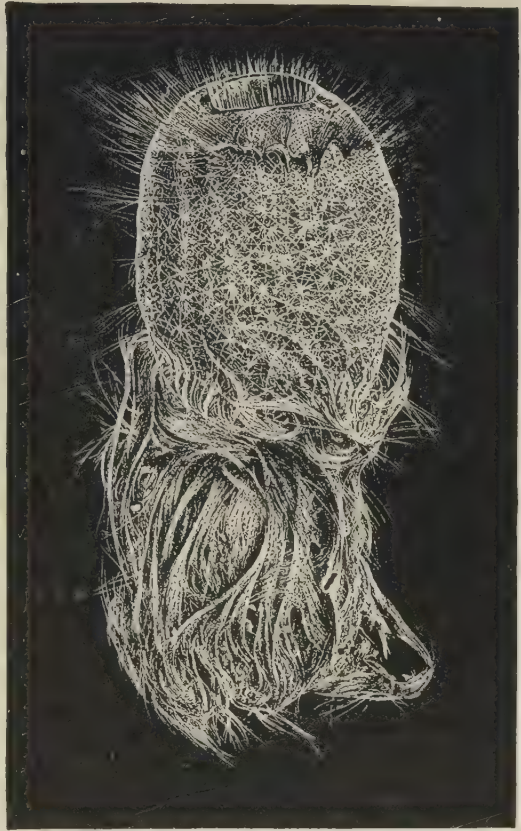
The sponge is the lowest animal that is made of more than one cell. The sponge has a stomach on the inside and bones on the outside. By living, a great many of them, in one house or village, like those old cliff-dwellers, all the little sponges get along better. They live very close neighbors, all work for each other, buy their food of the same grocer, and pay for it in a lump. Their house is a kind of fort, too. Larger water animals could "gobble up" millions of separate little sponges, but a whole village of them, in a horny house, is too big and tough a bite. It's a great thing to be sociable, to make friends and live in peace with neighbors. That makes life easier and pleasanter for boys and girls, bees and sponges.

The holes in the sponge are little mouths that lead into the village. Inside of it, when the sponge is alive, there are little one-room houses, and in these are packed, side by side, little jelly-like cells with tails. These tails stick out into the water and, like little fishermen, catch smaller plants and animals out of the water, as it passes through the sponge. At the same time these tails, or fishing poles, catch the water as it flows through the channels. The water also carries air, and the sponge gets its oxygen out of it. You see, the sponge like the fish, must breathe under water.

While the sponge is like an animal, in eating other little animals and plants, it is like a vegetable in that it cannot move around. It is rooted to one spot. The sponges grow so thickly that they often make perfect forests on the rocks, on the bottom of the sea. When the sponge is taken from the water it is covered with what seems to be a mass of jelly. This is its flesh, and the flesh is made up of the little cells with tails that I have been telling you about.

Just as if you might forget—although it seems so plain—that this sponge is made up of little creatures like the infusoria, and has become a higher order of animal because all these little animals formed into a society and worked together, the sponges increase by laying eggs; one-celled eggs. These eggs first turn into simple little animals with paddles all around them, like the infusoria, and they swim around by themselves, for awhile, before a number of them settle down together to form a sponge. They are like boys that go out into the world awhile to learn what it is like, and then join other boys and go into business together.

As we go along you will find nature continually "saying her piece" over again, from the beginning, as if to be sure she gets it right. And, also, I think, she may do it to be sure that we catch the idea of what wonderful things all of us can do in this world, if we will do each little thing, build each little thing, as well as we can, and keep looking upward as we build.



A sponge as it appears attached to the ocean bed. The little animals inside the horny skeleton stick hairy-like tails out into the water to catch their food.

It is as if nature said, after studying the yeast plant: "This yeast plant will make something better if it can get out into the world." So she took the same sort of little cells out where they could meet the air and the sun, and there came the liver-wort, part leaf and part root, and the first plant to find out how to make spores. Next came the mosses which began to stand up; and then the ferns which gave the vegetable world its backbone. Last of all came the flower-bearing plants, and with it the great partnership between the animal and the vegetable world, each helping the other to live.

But to do all her wonderful work Nature, like you and me, had to work with two hands. While with one hand she was helping the vegetables to get up high enough to receive the help of the animal world, in getting still higher; she had to teach the amoeba how to grow into birds and butterflies and men, so that they could come into this grand plan of things, and make more and more beautiful and useful varieties of animal and vegetable life.

Now, her work with her right hand, in growing the wonderful varieties of animals from the shapeless, formless amoeba, has got along as far as the sponges, which already have mouths and "hands" and the beginnings of bones, and a hollow inside.

Not only have sponges so many more useful and interesting parts than the amoeba, but they show, again, how fast you can make differences when you have more than one part to multiply with. Sponges have many different shapes, different colors, and they live in many different kinds of places. One kind of sponge is called the finger sponge, because it has fingers like the human hand. Another is shaped like a banana. Others are almost as round as a ball. Some look like a flat red mat, spread over the rocks under the water, as if for the entrance to the doorway to some palace of the water fairies. Some are black, some yellow, some brown.

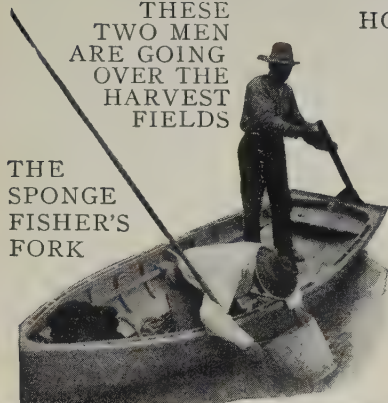
One kind of sponge looks like a beautiful vase of spun glass, and when these sponges were first brought to Europe, from their home in the South Pacific, they were not thought to be sponges at all, but vases made by very skillful workers in glass. They were known as "Venus' Flower Baskets."

The sponge itself is not only made up of other little animals living together, and getting food for one another, but other animals, of a higher order, are often found living in the cosy sponge village. In the larger sponges are found shrimps, crabs and even fishes. See SPONGES, page 1801.

FARMING UNDER THE SEA

THESE
TWO MEN
ARE GOING
OVER THE
HARVEST
FIELDS

THE
SPONGE
FISHER'S
FORK

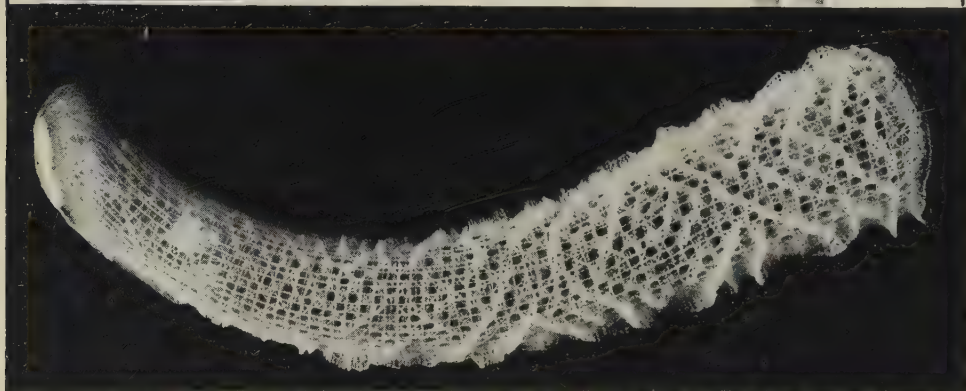


HOW THE SPONGE CROP
IS HARVESTED

"When the vessel reaches the grounds, the men go out in pairs in row boats, one man leaning over and scanning the sea bottom with a water glass. When a sponge is seen, it is secured with a kind of steel fork on a long slender pole."—*The New Student's Reference Work.*



THE
SPONGE
FARMER



DO YOU WONDER IT WAS MISTAKEN FOR SPUN GLASS?

"One kind of sponge looks like a beautiful vase of spun glass. When first brought to Europe they were not thought to be sponges at all, but vases made by very skillful workers in glass."

FROM SEA BOTTOM

Below, on the left, a Greek sponge gatherer is going down in a diving suit off the Florida coast. After being gathered, sponges are put into those wicker



TO THE MARKET

pens where the tide washes them, but cannot wash them away. Below, to the right, is a sponge market where the sponges are graded and offered for sale.





A GROUP OF SEA ANEMONES

III. A SEA FLOWER THAT EATS WITH ITS PETALS AND MOVES WHEN IT WANTS TO

The sponge, the jelly fish and the coral builder are hollow-bodied animals. They are higher than the amoeba because they have more different parts. The locomotive is a higher order of machine for moving things than baby brother's go-cart. So, the sea-anemone is higher than the sponge. It is very puzzling, but you like to study puzzles and find the answers, don't you?

Here's puzzle number one: Does the sea-anemone look most like an animal or a vegetable? You will see from the picture that the answer is very easy. But—

Why does it look so much like a vegetable? Well, why do your own lungs, that you breathe with, look like a vegetable?

Your lungs are shaped a good deal like a tree with trunk, limbs and branches; and, we might almost say, twigs and leaves. The lungs are spread out in this way to get the oxygen from the air that you breathe. The lungs digest air as your stomach digests its food. Because the air is not so solid as the food your stomach digests, it takes a good deal more of it for the lungs to get the amount of oxygen you need. So they are spread out to catch as much of this oxygen as possible every time you breathe. Leaves are the lungs of the plant. There must be a great many of them, and they must spread out to take in enough air and sunshine.

If you lived in the water all the time, as the sea-anemone does, and had to get oxygen out of the water, and had no special place inside of you in which to keep your lungs, you would have to be spread out as the anemone is, into as many branches as possible, and do all of your breathing through your skin. Then—if you were a sea-anemone—you would eat as it does. The way in which the anemone eats is something like the way in which the amoeba eats but yet is quite an improvement.

The anemone lies all spread out like a flower, until a fish or some other of the little animals, upon which it lives, comes swimming along. As soon as it touches the arms of the sea-anemone, which look like the petals of a flower, these "petals" close around it, just as your fingers close around an apple. They gather in the food and push it into the anemone's mouth. Then the anemone wraps its whole self around its food and shrinks up so that it looks like a

teacup turned upside down. It keeps to this shape until the food is digested. The anemone's stomach is in the center of its body, but it seems to take the whole inside of the anemone to digest its food, just as it does with the little amoeba.

The anemone's stomach is one of the queerest things you ever saw. It is surrounded by little rooms that are connected with each other by two openings that we might call "windows." Each of these rooms is also connected with the stomach in the middle, and with those parts which, as you see, look like the petals of a flower, when the anemone is spread out, waiting for its food. Each of these "petals" is hollow like the fingers of a glove. The anemone not only lives surrounded by water on the outside, but it is full of water on the inside. Water is to the anemone what blood is to you; it circulates all through the anemone, and the anemone makes its petal-like fingers stand up by filling them with water. These fingers are called tentacles. When the little animals on which the anemone lives, touch one of these tentacles, the anemone forces a large part of the water out of itself, shrinks up around its food and becomes a little upside down cup of an animal, with thin walls.

The sea-anemone not only looks like the flower of that name, but it has something that reminds us of the vine called the Virginia Creeper. The anemone is fastened to a rock by a sucking disc. It holds on with this sucker a great deal tighter than the vine clings to a wall it is climbing, with its little sucker feet. If you try to pull a sea-anemone up, you might think it has a strong root running down into the rock. But it has only a sucker foot for clinging. Sea-anemones have been known to move, but as a rule they spend their lives contentedly, fastened to rocks near which they are born.

This use of a sucker foot by the sea-anemone and the vine, is one of the many cases in which nature gets hold of a good idea and uses it over and over again. And she uses the sucker foot for plants and animals just as she uses the seed or egg for ferns and fishes, butternuts and butterflies. She gave the sea-anemone a sucker foot because he can get along best by clinging to a rock, and she gave the vine sucker feet to climb rocks and trees with. When the sucker foot idea once got into the two families of living things, Mother Nature seemed to say:

"Now all of you children who can use it, may have this little sucker foot."

The oyster and the clam both have a sucker foot. The oyster uses his to fasten himself to something, as the anemone does, and stays there. But the clam uses his foot for travelling. So, the oyster, lying in one position, gets a shell that looks lop-sided, but the clam's shell has both valves alike. People who live by themselves, in one place, get one-sided, too. Instead of saying "don't be a clam" we ought to say, "don't be an oyster." The clam is well-balanced. A man is well-balanced who can see both sides of a question.

My! My! Here we have wandered away from the sea-anemone looking at vines, clams and oysters, seeds and travelling minds, and almost have forgotten our little sea-anemone! But here he is sticking patiently to his rock. Perhaps he has other things to tell us.

"Yes, indeed," he says. "When you were speaking of sucker-feet you didn't mention the fact that I had them long before there were sucker mouths. And how would human and some other animal babies get along without those, I'd like to know. You smack your lips over something good, don't you? And you pucker it to kiss with, too. I taught you how. I pucker my sucker foot to cling with."

"And I taught birds to lay eggs. Well, I'm ready to admit that the sponge taught me."

Anemones, like the sponges, make eggs, or seed babies. These eggs hatch into odd little animals that, for awhile, swim about in the water. They finally settle down on a rock, and grow into these beautiful flower-like animals that are found in the gardens under the great waters of the world. You can see that the anemone, which is so much higher a type than the sponge, at the same time repeats the habits of the sponge in first being a free, swimming animal, and then settling down in one spot. The anemone, however, can move about a little while, but the sponge cannot. After it once settles down the sponge must stay there for life. The anemone can move only a few inches a day; so I suppose it says, "Oh what's the use," and generally it stays in one place.

But, low down as it is in the scale of life, like the jelly fish, the anemone has learned how to move. So, it begins to foretell the wonderful animals that are coming, that can swim in the water, fly in the air, and finally run about on the land. And that's foretelling little boys and girls, you know.

My! But wasn't it a *tre-mend*-ous thing for a little sea-anemone to let go of the rock and move, if ever so little a way? See SEA-ANEMONE, page 1712.

IV. THE WEB OF LIFE: MOTHER NATURE AT HER LOOM

Big boys and girls, when they finish high-school, have to write graduation essays. One of the subjects they often choose to write about is "The Web of Life is Strangely Woven." They like to tell how life is made up of different things, all woven together: Joy and sorrow, health and sickness, work and play are woven in and out into one web. They see the poetry and the prose of living, loving, working, enjoying.

The writer of this had been out of school a long, long time before he learned that his own body was just such a wonderful web. A living body, of a plant or an animal, is a web. It is made up of single cells, multiplied and woven together. Mother Nature uses the same kind of cells, put together in different ways, to make leaf, stem, bark, flower and fruit, in the tree. So she makes skin-tissue, bone-tissue, muscle-tissue, nerve-tissue in the animal.

It took Mother Nature ages and ages, sitting at her loom, experimenting, to learn to make these different tissues out of one material. In the amoeba she had only a very thin skin and a jelly-like muscle. In the sponge she made a horny bone. In the earthworm she made the first ring muscle.

If you get up very close to Mother Nature, as she sits at her loom, you can watch how she works. Her shuttle has a back and forth movement, through the long web of lives. First, she made a plant cell that couldn't move, then an animal that could. Then she made the sponge, an animal that was fastened to a rock, like a deep-sea lichen; then a sea-anemone that could let go of the rock. The amoeba hasn't any bones, the sponge has, the jelly-fish hasn't, the star-fish has. Now bones are very important. Why, when Mother Nature learned to make them for sponges, did she drop the idea, and then come back to it afterwards?

Let us see if we can find out. We will also see Mother Nature weaving lower forms of life into the higher. What looks more different than Johnny with his fishing pole, and the earthworm he uses for bait? Yet there are many things about that earthworm that are just like things in Johnny. The earthworm's body is made up of ring muscles. Those are the very first hints of the ring-joints in Johnny's backbone. Those ring muscles are what makes it possible

for the earthworm to turn and twist and move forward and to shrink.

Yet, in making those ring muscles for the earthworm, Mother Nature's shuttle shot back across the web. She dropped the bones she made for the sponge and star-fish. One thing at a time, she says. I'll go back for those bones, when I get ready to put the earthworm into a shell. The crawfish is only a worm in a shell. The spider, the ant, the bee and the fly are all ring-jointed, but have no shell. When she got up to insects, Mother Nature dropped the bone or shell idea, to make better brains and senses. The bee, the ant, and the spider have such large brains, in proportion to their bodies, that they are a wonder to men.

Having made brains and sensitive nerves, Mother Nature began to use bones again. But when she made ring bones along the back of the fish, she dropped behind in brain power. A fish isn't nearly as bright as an insect. A reptile is a little brighter than a fish, a bird—you know how "smart" a crow is? By and by, Mother Nature made little boys and girls who can read, and understand this story of life.

It is very important to have a backbone, something to stand up with. You saw that in the great world of plants, when the simple yeast cell was slowly changed into the noble forest trees. All animals with a backbone are put into one class, called vertebrates. Those without backbones are called invertebrates.

Man is the most wonderful of all the animals, but even he isn't as clever in everything as are many of his humble relatives. He cannot swim like the fish, nor fly like the bird. That is he cannot do these things at first. But he has brains to "think out" things. Then he can build ships and flying machines.

When he first comes into the world, man is the most helpless of all animals, and he remains helpless the longest. But that is an improvement. It was a great thing in the history of life when animals began to think about their babies, and about taking care of them. Little insects born as creeping larva, are able to take care of themselves as soon as they come out of the cocoon. But they never get very far, and they soon die. It is only when animals begin to spend a part of their lives learning things of their mamas—as spiders and ants and bees and birds do—that they amount to much.

The children of savage men—such as Indians—live longer with their parents and depend upon them more than do the animals, and so they learn still more. White children spend still more of their

time at home, and at a great place called school, which gives all of its time to carrying on the work that is begun in the home.

In both home and school the greatest thing of all that a boy or girl learns, is to love and to help other people. So far as his body is concerned, a boy doesn't differ so very much from animals lower than himself. He differs most of all in his power to reason, and to think and to care for the happiness of others. He has a sense of right and wrong, of honor, of justice, of unselfishness, of fair play, of pity. These are the social and moral powers that, alone, make human beings far above all the other animals.

But these fine feelings, too, began far back with the first animals that cared for their babies. Long before Mother Nature got up to human beings, she made ants and bees live and work in colonies, and birds care tenderly for their nestlings.

What, do you suppose, was the very first animal that carried her helpless babies about with her, and fed them in some strange way?

